OMRON

CIDRW SYSTEM

V640 SERIES

USER'S MANUAL

AMPLIFIER UNITS

V640-HAM11-V4

V640-HAM11-L-V2

CIDRW HEADS

V640-HS61

V640-HS62

CIDRW CONTROLLER

V700-L22

LINK UNIT

V700-L11

Man. No. Z360-E1-01

Introduction

Thank you for purchasing the V640-series CIDRW System.
Please observe the following points when operating the V640-series CIDRW System:

- Allow the CIDRW System to be installed and operated only by qualified specialist with a sufficient knowledge of electrical systems.
- Please read and understand the contents of this manual before using the system.
- After reading this manual, store it in a convenient location for easy reference whenever necessary.

Introduction	Table of Contents/Precautions in Using the Products
SECTION 1	Product Outline
SECTION 2	Installation and Connections/Wiring
SECTION 3	Preparing for Communications
SECTION 4	Reading from/Writing to ID Tags
SECTION 5	Troubleshooting
SECTION 6	Appendix

CIDRW System

V640-HAM11-V4	Amplifier Unit
V640-HAM11-L-V2	Amplifier Unit
V640-HS61	CIDRW Head
V640-HS62	CIDRW Head
V700-L22	CIDRW Controller
V700-L11	Link Unit

User's Manual

READ AND UNDERSTAND THIS DOCUMENT

Please read and understand this document before using the products. Please consult your OMRON representative if you have any questions or comments.

WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.
OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.
In no event shall responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.
IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

SUITABILITY FOR USE

THE PRODUCTS CONTAINED IN THIS DOCUMENT ARE NOT SAFETY RATED. THEY ARE NOT DESIGNED OR RATED FOR ENSURING SAFETY OF PERSONS, AND SHOULD NOT BE RELIED UPON AS A SAFETY COMPONENT OR PROTECTIVE DEVICE FOR SUCH PURPOSES. Please refer to separate catalogs for OMRON's safety rated products.
OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the product.
At the customer's request, OMRON will provide applicable third party certification documents identifying ratings and limitations of use that apply to the products. This information by itself is not sufficient for a complete determination of the suitability of the products in combination with the end product, machine, system, or other application or use.
The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products:

- Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this document.
- Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
- Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.
NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

PERFORMANCE DATA

Performance data given in this document is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON Warranty and Limitations of Liability.

CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons.
It is our practice to change model numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the product may be changed without any notice. When in doubt, special model numbers may be assigned to fix or establish key specifications for your application on your request. Please consult with your OMRON representative at any time to confirm actual specifications of purchased products.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

ERRORS AND OMISSIONS

The information in this document has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical, or proofreading errors, or omissions.

PROGRAMMABLE PRODUCTS

OMRON shall not be responsible for the user's programming of a programmable product, or any consequence thereof.

COPYRIGHT AND COPY PERMISSION

This document shall not be copied for sales or promotions without permission. This document is protected by copyright and is intended solely for use in conjunction with the product. Please notify us before copying or reproducing this document in any manner, for any other purpose. If copying or transmitting this document to another, please copy or transmit it in its entirety.

To Users of the V700-L21 CIDRW Controller

The V700-L22 CIDRW Controller complies with the 2003 edition of the SEMI E99 standard. The V700-L21 CIDRW Controller cannot simply be replaced with the V700-L22. To replace the V700-L21 with the V700-L22, the control programming for the CIDRW Controller must be updated as described in this manual.

■ Main Differences from the V700-L21

• Added Attributes

The CIDRW attributes defined as CarrierIDOffset and CarrierIDlength in the 2003 edition of the SEMI E99 standard have been added. With the V700-L22, the user can now specify as attributes the position of the MID in the ID Tag, and the data length.

Refer to Support Attributes p.154.

• Changed Message Specifications

The 2003 edition of SEMI E99 adds a format definition for the data item MID in the message specifications. The specifications of the data item MID have changed in the V700-L22.

Refer to Message Specifications p.72.

• Added Data Area Access Function

A function for specifying ID Tag data area access destinations as offset addresses has been added to the V700-L22. The V700-L21 divides the data area into 8-byte units called segments, and reads and writes data to each segment. Besides this, the V700-L22 also allows you to specify offset addresses relative to the first address in the ID Tag data area, so that data can be read and written in units of one byte.

Refer to Message Specifications p.72.

• Replacing the V700-L21 with theV700-L22

The following settings are required to replace the V700-L21 with the V700-L22.

(1) Set the CarrierIDOffset and CarrierIDlength attributes.
Set CarrierIDOffset to 0 and set CarrierIDlength to the data length of the data item MID specified by the ID write request (S18F11). If there is a mismatch between the CarrierIDlength attribute and the MID length in the ID write request (S18F11), a CE (communications error) occurs, and no data is written.

(2) Change the MID to data consisting of displayable ASCII characters only.
With the V700-L22, data that includes undisplayable ASCII characters cannot be read with an ID read request (S18F9); an EE (execution error) occurs. Data including undisplayable ASCII characters in the MID cannot be specified with an ID write request (S18F11).

CHECK!

With the V700-L21, the MID to be read or written is assigned to an area fixed at 16 bytes. If the specified data length in the ID write request (S18F11) is less than 16 bytes, NUL characters are added in internal processing to make the total 16 bytes. In contrast, with the V700-L22, the accessible MID data occupies only the area specified by the CarrierIDOffset and CarrierIDlength attributes. Data can be read or written only in the area specified by the attributes.

Applicable SEMI Standards

This CIDRW system complies with the following standards.

- SEMI E99 THE CARRIER ID READER/WRITER FUNCTIONAL STANDARD
- SEMI E5 EQUIPMENT COMMUNICATION STANDARD 2 MESSAGE CONTENT (SECS II)
- SEMI E4 EQUIPMENT COMMUNICATION STANDARD 1 MESSAGE TRANSFER (SECS I)

SEMI is the acronym for Semiconductor Equipment and Materials International.
SECS is the acronym for SEMI Equipment Communication Standard.

Safety Precautions

● Definition of Precautionary Information

The following notation and alert symbols are used in this User's Manual to provide precautions required to ensure safe usage of a V640-series CIDRW System. The safety precautions that are provided are extremely important to safety. Always read and heed the information provided in all safety precautions.
The following signal words are used in this manual.

⚠WARNING	Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury, or may result in serious injury or death. Additionally there may be significant property damage.

● Meanings of Alert Symbols

	Prohibition Indicates general prohibitions for which there is no specific symbol.

Precautions for Safe Use

Please observe the following precautions for safe use of the products.

- Never use the product in an environment where combustible or explosivegas is present.
- Please separate from a high-pressure equipment and the power equipment to secure the safety of the operation and maintenance.
- In the installation, please tighten the screw surely. (Recommended 1.2N·m)
- Please do not insert foreign bodies such as water and the wires from the space of the case.
- Please do not dismantle, repair or modify this product.
- Please process as industrial waste when you abandon this product.
- When you work on wiring and put on and take off cables, CIDRW head, please perform it after switching off this product.
- Provide enough space around this product for ventilation.
- Please avoid installing this product near the machinery (a heater, a transformer, large-capacity resistance) that has high the calorific value. hen you felt abnormality to this product, and having switched it off.

Confirm the effects of radio waves on medical devices. The following guideline is from JAISA (Japan Automatic Identification Systems Association).

> This product is a reader-writer that uses radio waves for RFID equipment. The application and location of this product may affect medical devices. The following precaution must be observed in the application of the product to minimize the effects on medical devices.
> Any person with an implanted medical device must keep the area where the device is implanted at least 22 cm away from the antenna of a stationary or modular RFID device.

Precautions for Correct Use

Please observe the following precautions to prevent failure to operate, malfunctions, or undesirable effects on product performance.

■ About installation Site

Do not install this product in the locations subject to the following conditions.

- Place where direct sunshine strikes.
- Place with corroded gas, dust, metallic powder, and salinity.
- Place with condensation due to rapid temperature fluctuations.
- Place with condensation due to high humidity.
- Place where vibration and impact more than being provided by specification are transmitted directly to main body.
- Place with spray of water, oil, and chemical medicine.
- The working temperature is within the range stipulated in the specifications.

■ About depositoty Site

- Please follow the save ambient temperature / humidity, and keep this product.

■ About wiring

- Use the power supply voltage specified in this cocument.
- Ensure correct polarity when connecting to the +/- power supply terminals.
- Do not run high-voltage lines and power lines though the same conduit.
- To avoid static-induced failure, wear a wrist band or equivalent means to release a static charge before touching a terminal or a signal line within a connector.
- When you put on and take off a CIDRW head, please do not add excessive power to a connector.
- Please connect the correct CIDRW head to the amplifier unit.

■ About cleaning

- Use alcohol to clean this product.
- Never use an organic solvent such as thinner, benzene, acetone or kerosene, as it will attack resin components or case coating.

■ Power and Graound Cables

- Use an appropriate ground. An insufficient ground can affect this product operation or result in damage to this product.

■ About the communication range and time

- Do the communication test with Transponder in the installation environment because the metal, noise and ambient temperature around CIDRW head damage to the communication range and time.
- Install CIDRW head and ID tag in the appropriate distance because the communication range can change by the difference of ID tag specifications.

■ About mounting

- This product communicates with ID Tags using the 134 kHZ frequency band. Some transceivers, motors, monitoring equipment, and power supplies (power supply ICs) generate electrical waves (noise) that interfere with communications with ID Tags, If you are using the product in the vicinity of any of these devices, check the effect on communications in advance.
- In order to minimize the effects of noise, ground nearby metal bodies with a grounding resistance not exceeding 100 ohms.
- When mounting CIDRW Heads, tighten the screws tightly.(Recommended 0.6N·m)
- When multiple CIDRW Heads are mounted next to each other, communications performance could be impaired by mutual interference. Read and follow the information in this manual on mutual interference when installing multiple heads.

Refer to page 124.

■ Screw Locking Adhesive

- Screw locking adhesive (screw lock) may cause deterioration and cracking of resin parts; do not use it for screws in resin parts or anywhere where resin washers are used.

■ Communications with the Host Device

Communicate with the host device only after confirming that the CIDRW Controller has started. Also, unstable signals may occur at the host interface when the CIDRW Controller is started. When initializing operation, clear the reception buffer at the host device or take other suitable methods to clear unwanted signals.

■ Startup Precaution

Never turn OFF the power supply while the CIDRW Controller is starting, including when power is turned ON, when the mode is changed, or when the CIDRW Controller is being reset. Doing so may damage the CIDRW Controller.

■ About Transponder and RF module made by Texas Instruments Co.

(1) We can’t warrant the specifications of the communication with Transponder and RF module.
(2) When the RF module is at fault, we can’t analyze the RF module.

■ The characteristics of the V640-HAM11-V3(-L) / V640-HAM11-V4(-L-V2)

It is a circuit, designed to communicate characteristics match, but because it is intended to carry out the communication with RF module and the transponder, can not be guaranteed.

Reading this Manual

Visual Aids

NOTICE Indicates an explanation of a point that must be observed to ensure that the product is capable of its proper functions and performance. Read this information carefully and follow the cautions. If the product is used incorrectly, data or the equipment itself could be destroyed.

CHECK! Indicates summaries of points of particular importance relating to product performance, e.g., points to note during operation and advice on how to use the product.

Indicates the number of a page where related information can be found.

Indicates information for reference when you encounter a problem.

Indicator Status

The following symbols are used to show the status of the indicators on the CIDRW Controller and Amplifier Units.

OFF

Flashing

ON

MEMO

Table of Contents

Introduction 1
To Users of the V700-L21 CIDRW Controller 4
Applicable Standards 5
Applicable SEMI Standards 8
Safety Precautions 9
Precautions for Safe Use 10
Precautions for Correct Use 11
Reading this Manual 13
Table of Contents 15

SECTION 1 Product Outline 17
What Is a CIDRW System 18
Features 19
System Configuration 20
Component Names and Functions 21
Flowchart for Getting Started 26

SECTION 2 Installation and Connections/Wiring 31
Installation 32
Connections and Wiring 37

SECTION 3 Preparing for Communications 53
Setting the Communications Conditions for the CIDRW Controller 54
Setting the Communications Conditions for Amplifier Units 67
Setting the Communications Conditions for Link Units 69
Communications Test 70

SECTION 4 Reading from/Writing to ID Tags 75
When SECS Is Used 76
When SECS Is Not Used 87

SECTION 5 Troubleshooting 101

When SECS Is Used 102
When SECS Is Not Used 108

SECTION 6 Appendix 115

Specifications and Dimensions 116
System Configuration Examples 121
Characteristic Data According to Conditions of Use 123
ID Tag Memory Maps 153
Regular Inspection 154
SECS Protocol Specifications 155
ASCII Code Table 160
Protective Construction 161
Revision History 164

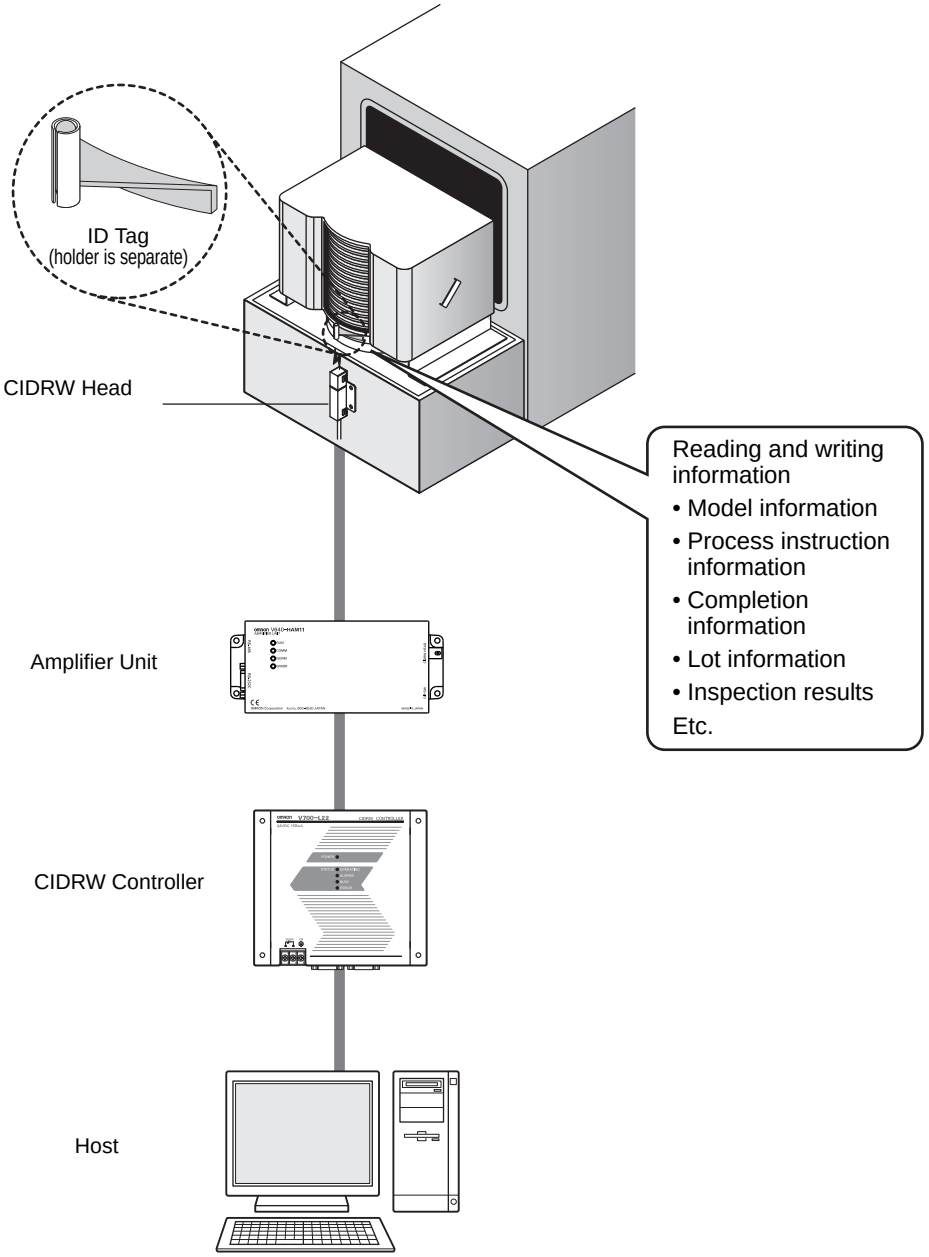
SECTION 1
Product Outline

What Is a CIDRW System	14
Features	15
System Configuration	16
Component Names and Functions	17
Flowchart for Getting Started	22

What Is a CIDRW System

The CIDRW system writes data to, and reads data from, the carrier IDs (ID Tags) mounted on the carriers (FOUP) in semiconductor manufacturing processes without contacting these ID Tags. CIDRW is the abbreviation of Carrier ID Reader/Writer and this abbreviation is used throughout this manual.
Reading and writing information such as models, process instructions, lots, and inspection results to and from ID Tags makes it possible to manage work instruction information from a host device.

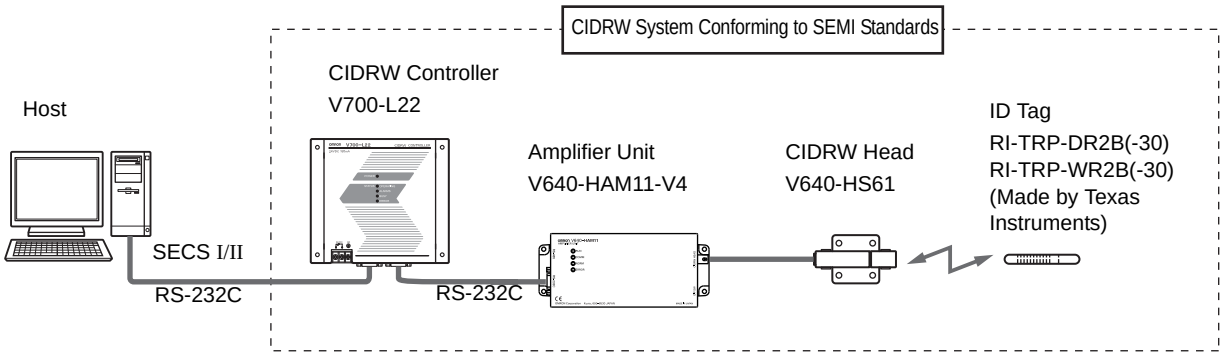
Example: Management of information in semiconductor and wafer manufacturing processes



Features

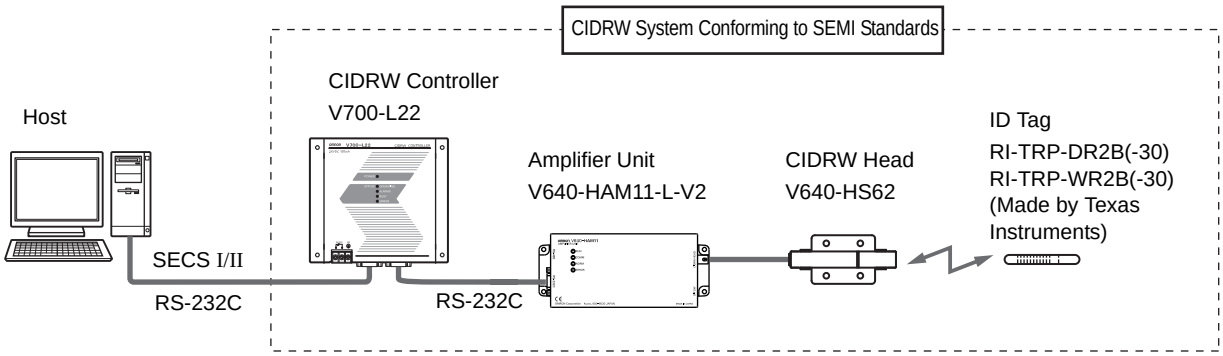
■ CIDRW Systems That Conform to SEMI Standards (SEMI E99, E5, E4)

• V640-HAM11-V4



The V640-HS61 CIDRW Head can be connected to V640-HAM11-V4 Amplifier Units to communicate with ID Tags.

• V640-HAM11-L-V2



The V640-HS62 CIDRW Head can be connected to V640-HAM11-L-V2 Amplifier Units to communicate long-distance with ID Tags. The functions of the V640-HAM11-L-V2 Amplifier Unit are the same as the functions of the V640-HAM11-V4 Amplifier Unit.

List of Applicable Standards

- SEMI E99 THE CARRIER ID READER/WRITER FUNCTIONAL STANDARD
- SEMI E5 EQUIPMENT COMMUNICATION STANDARD 2 MESSAGE CONTENT (SECS II)
- SEMI E4 EQUIPMENT COMMUNICATION STANDARD 1 MESSAGE TRANSFER (SECS I)

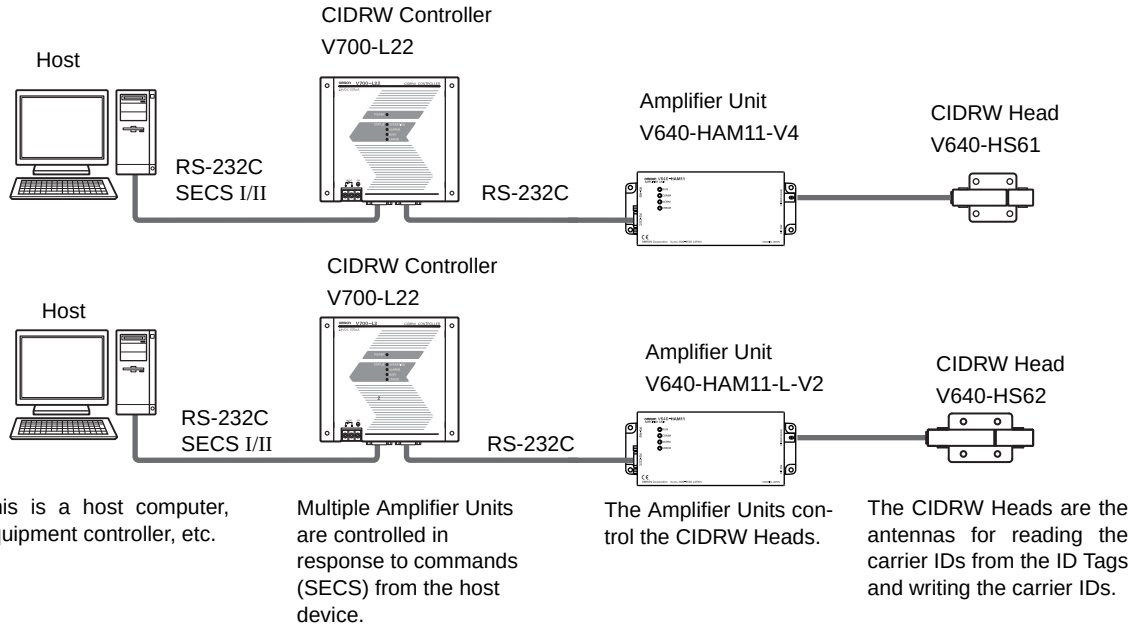
SEMI is the acronym for Semiconductor Equipment and Materials International.
SECS is the acronym for SEMI Equipment Communications Standard.

The V640-HAM11-V4 or V640-HAM11-L-V2 will automatically detect the model and read/write data for RI-TRP-DR2B(-30) and RI-TRP--WR2B(-30) ID Tags manufacturer by Texas Instruments.

System Configuration

When SECS Is Used

Communications with the host device is possible using the SECS protocol.



This is a host computer, equipment controller, etc.

Multiple Amplifier Units are controlled in response to commands (SECS) from the host device.

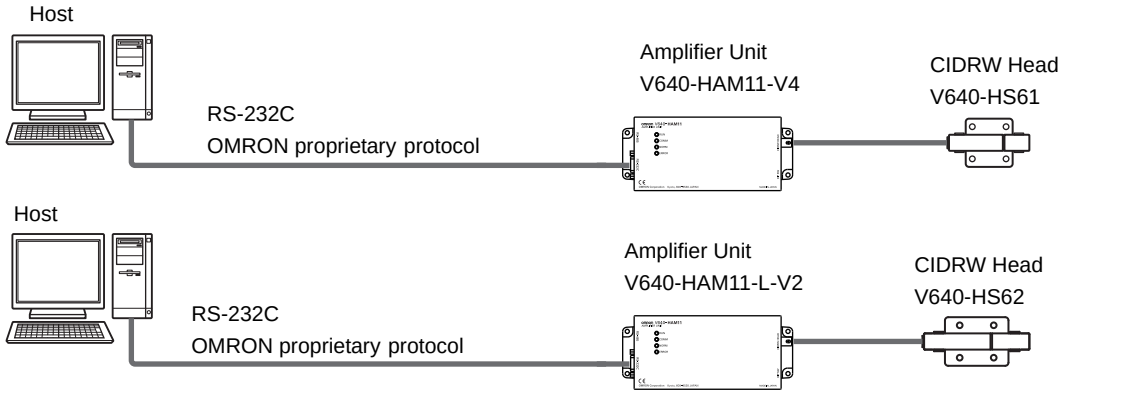
The Amplifier Units control the CIDRW Heads.

The CIDRW Heads are the antennas for reading the carrier IDs from the ID Tags and writing the carrier IDs.

When SECS Is Not Used

Communications with the host device follow the OMRON proprietary protocol.

The Amplifier Units are connected directly to the host device without using a CIDRW Controller.



This is a host computer, equipment controller, etc.

The Amplifier Units control the CIDRW Heads.

The CIDRW Heads are the antennas for reading the carrier IDs from the ID Tags and writing the carrier IDs.

CHECK!

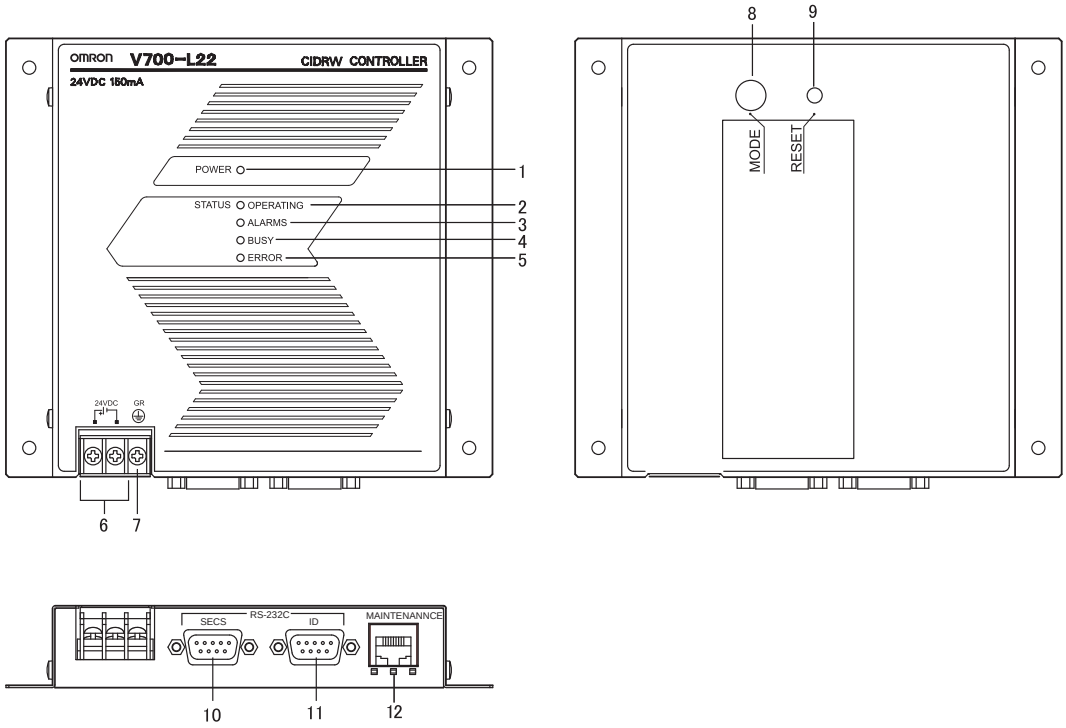
Refer to the following page for connection examples for more than one Amplifier Units or for connection examples for using the V700-L11 Link Unit.

page 117

Using Link Units (V700-L11) to make connections makes it possible to remove and replace just the relevant Amplifier Unit while leaving the power to the CIDRW system on in the event of a failure or during maintenance.

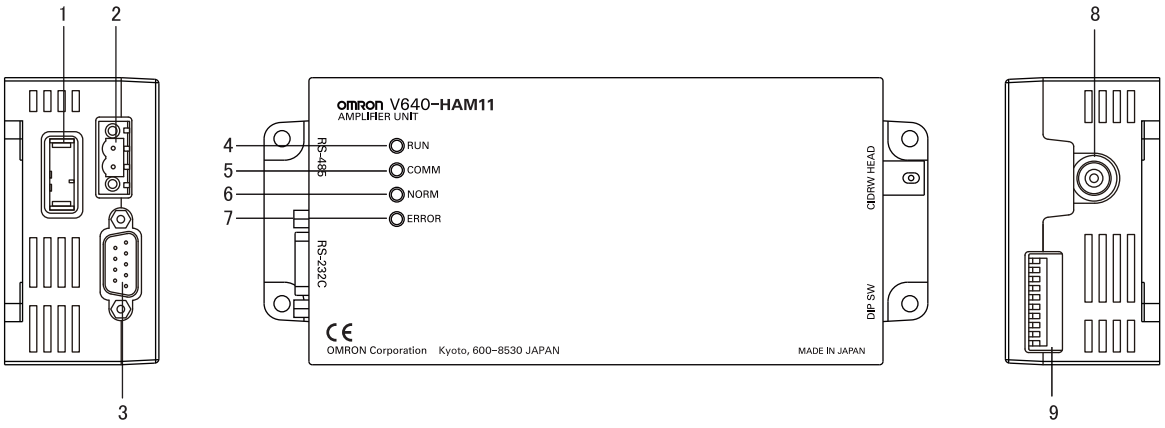
Component Names and Functions

V700-L22 CIDRW Controller



No.	Name	Function
1	Power indicator (green)	An indicator that indicates whether the power is ON or OFF. Lit while the power is ON.
2	OPERATING indicator (green)	Lit while the CIDRW system status model is operating.
3	ALARMS indicator (green)	Lit when the status in "Alarm Status" of the CIDRW system is Alarm (1).
4	BUSY indicator (green)	Lit when the status in "Operational Status" of the CIDRW system is BUSY.
5	ERROR indicator (red)	When a processing error is detected (when SSACK is other than NO), this indicator is lit for 50 ms.
6	24 VDC power supply terminals (with cover)	Connect to the 24 VDC power supply.
7	Frame ground terminal (with cover)	The grounding wire is connected here. (Ground to 100 Ω or less)
8	MODE switch	Used to select the mode of operation. Refer to page 50. 0: Normal Operation mode. When mounting the Controller, set the switch to this position. 3: Setting mode, selected to set information such as the communications conditions. When the switch on the bottom face of the Controller cannot be accessed, the operation mode can be changed from the host device while the switch is left at the 0 setting. 1 to 2, 4 to 7: Setting prohibited
9	RESET switch	Restarts the CIDRW Controller.
10	SECS port	Port for connecting the host device. Conforms to SECS I/II.
11	ID port	An Amplifier Unit or Link Unit is connected here.
12	Maintenance port (with cover)	Not used. Do not remove the cover.

V640-HAM11-V4 and V640-HAM11-L-V2 Amplifier Units



No.	Name	Function
1	Dedicated power supply connector	Connect to the 24 VDC power supply.
2	RS-485 port	When using multiple CIDRW Heads, connect this to the RS-485 port of another Amplifier Unit or to the multi-connection port of a Link Unit.
3	RS-232C port	Connected to a CIDRW Controller or a host device. Uses the OMRON proprietary communications protocol.
4	RUN indicator (green)	Turns ON when the Amplifier Unit is in normal operation.
5	COMM indicator (yellow)	Turns ON during communications with the host device or during communications with an ID Tag.
6	NORM indicator (green)	Turns ON when the communications finish with no error.
7	ERROR indicator (red)	Turns ON when an error occurs during communications with the host device, or during communications with an ID Tag.
8	CIDRW Head connection port	A CIDRW Head is connected here.
9	Setting DIP switches	Used to set the node number, the communications conditions, and the RS-485 terminal resistance.

■ Functions

• NOISE MEASUREMENT

The levels of noise in the vicinity of the CIDRW Head are measured and the noise level is expressed numerically in the range "00" to "99.

Refer to page 96, page 148.

• Detecting for CIDRW Head status

You can confirm if the CIDRW Head is connected to the Amplifier Unit correctly.

Refer to page 94.

• Test Mode

Test Mode can be used to check communications between the ID Tags and Amplifier Units without connecting a host device. Communications with ID Tags are automatically performed every second and the communications results are displayed on the OPERATING indicator.

Refer to page 63.

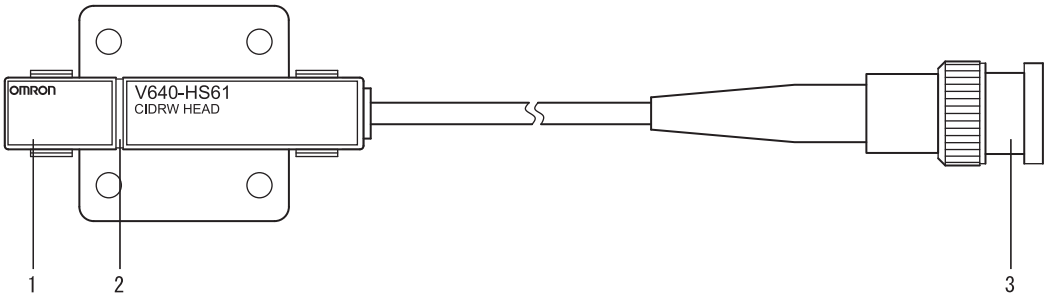
CHECK! Refer to *V640-HAM11-V4 and V640-HAM11-L-V2 Amplifier Units* for information on the OPERATING indicator for communications results.
page 18

CHECK! Always connect the CIDRW Head before operating the Amplifier Unit in Test Mode. If Test Mode is used without connecting a CIDRW Head, the ERROR indicator will light and Amplifier Unit operation will stop.

CHECK! Commands from the host device are not accepted during operation in Test Mode. To end Test Mode, turn OFF the Test Mode pin on the DIP switch and restart the Amplifier Unit.

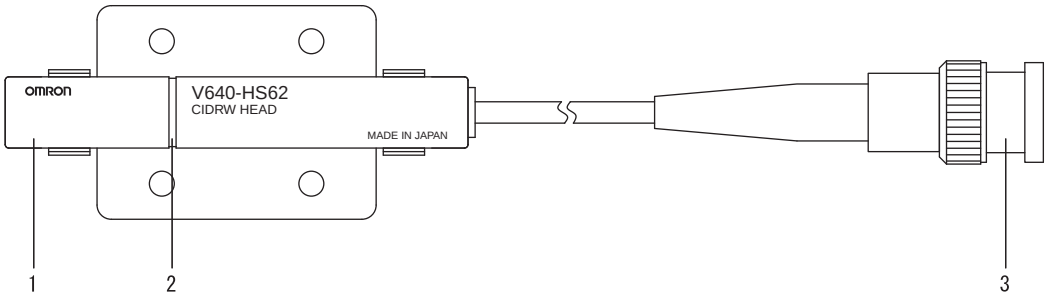
V640-HS61 and V640-HS62 CIDRW Heads

■ V640-HS61



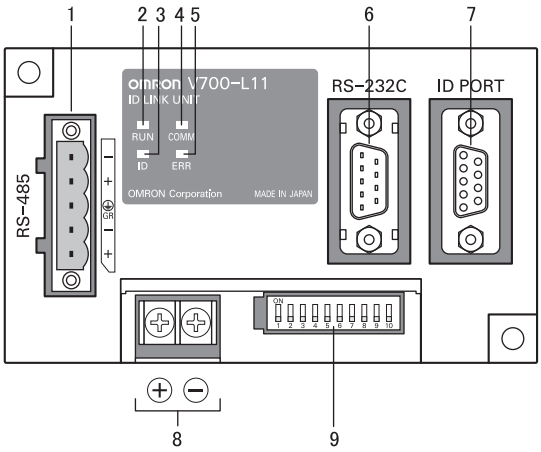
No.	Name	Function
1	Antenna	Used to communicate with ID Tags.
2	Antenna center	This is the center of the communications area.
3	Connector	Connect to an Amplifier Unit.

■ V640-HS62



No.	Name	Function
1	Antenna	Used to communicate with ID Tags.
2	Antenna center	This is the center of the communications area.
3	Connector	Connect to an Amplifier Unit.

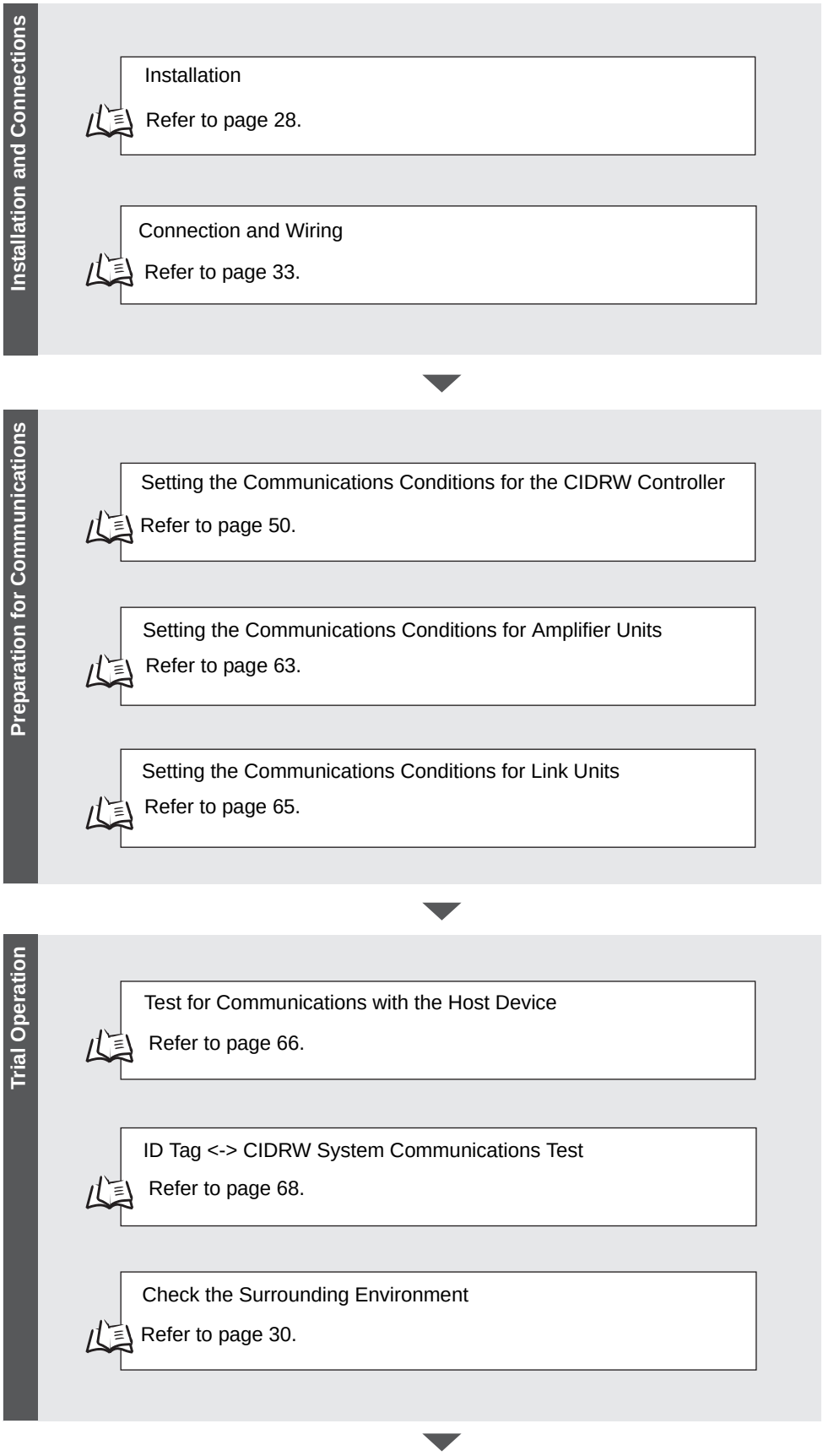
V700-L11 Link Unit



No.	Name	Function
1	Multi-connection port (RS-485)	This is the port that connects to the Amplifier Units when multiple CIDRW Heads are connected to a CIDRW Controller. The GR (frame ground) terminal is also at this port.
2	RUN indicator (green)	Turns ON while the Link Unit is in normal operation.
3	ID indicator (green)	Not used
4	COMM indicator (green)	Turns ON during data communications with the host device.
5	ERR indicator (red)	Turns ON when an error occurs during data communications with the host device or Head.
6	Host device connection port (RS-232C)	This is a port for connecting to the CIDRW Controller via an RS-232C interface. A dust cover is fitted on shipment from the factory. Remove this cover before using the port.
7	ID connection port	Not used
8	24 V power supply terminals (inside the cover)	Connect to the 24 VDC power supply.
9	Setting DIP switches (inside the cover)	Used to set the equipment number, the communications conditions, and the RS-485 terminal resistance.

Flowchart for Getting Started

When SECS Is Used


Installation and Connections
Installation
Refer to page 28.
Connection and Wiring
Refer to page 33.
Preparation for Communications
Setting the Communications Conditions for the CIDRW Controller
Refer to page 50.
Setting the Communications Conditions for Amplifier Units
Refer to page 63.
Setting the Communications Conditions for Link Units
Refer to page 65.
Trial Operation
Test for Communications with the Host Device
Refer to page 66.
ID Tag <-> CIDRW System Communications Test
Refer to page 68.
Check the Surrounding Environment
Refer to page 30.

Communications

When SECS Is Used

Refer to page 72.

When you Encounter a Problem...

When SECS Is Used

Refer to page 98. List of Error Messages

Refer to page 98. Controller Indicators

Refer to page 99. Operation Check Flowchart

When SECS Is Not Used

Installation and Connections

Installation

Refer to page 28.

Connection and Wiring

Refer to page 33.

Preparation for Communications

Setting the Communications Conditions for Amplifier Units

Refer to page 63.

Setting the Communications Conditions for Link Units

Refer to page 65.

Trial Operation

Test for Communications with the Host Device

Refer to page 66.

Communications Test between ID Tags and CIDRW System

Refer to page 68.

Check the Surrounding Environment

Refer to page 30.

Communications

When SECS Is Not Used

Refer to page 83.

If you Encounter a Problem...

When SECS Is Not Used

Refer to page 104. List of Error Messages

Refer to page 104. Amplifier Unit Indicators

Refer to page 105. Operation Check Flowchart

MEMO

SECTION 2
Installation and Connections/Wiring

Installation 28

- CIDRW Controller 28
- Amplifier Unit 29
- CIDRW Head 30
- Link Unit 32

Connections and Wiring 33

- CIDRW Controller 33
- Amplifier Unit 36
- Link Unit 43

Installation

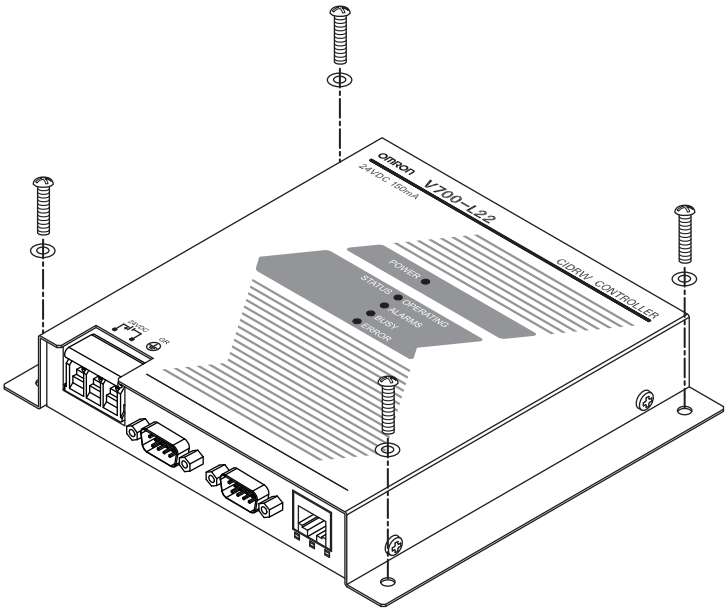
CIDRW Controller

NOTICE There is a switch for selecting the operation mode (Normal Operation mode <-> Setting mode) on the bottom face of the CIDRW Controller. Set the communications conditions in the Setting mode (switch position 3) before mounting the CIDRW Controller.

Refer to page 50.

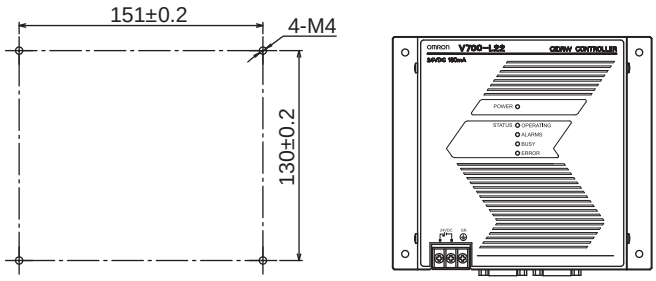
Set the Controller to the Normal Operation mode (switch position 0) when mounting it.

Mount the CIDRW Controller with the resin washers and four M4 screws provided as accessories.



Mounting dimensions

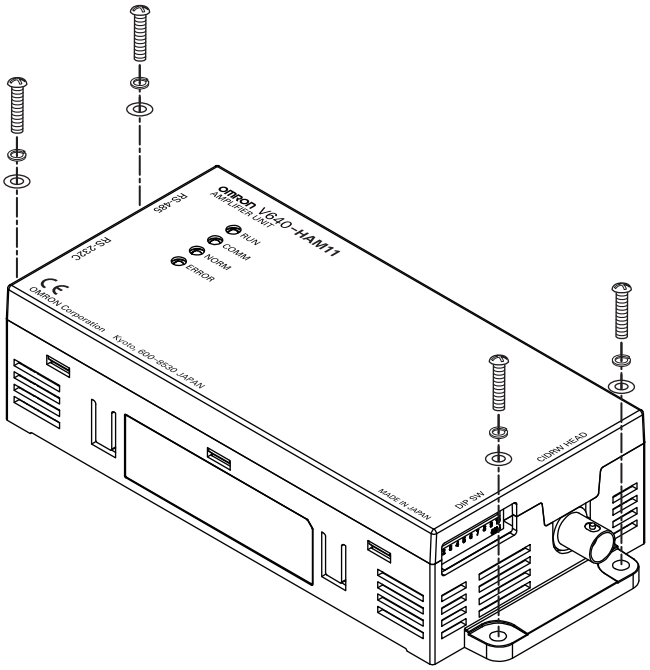
(Unit: mm)



NOTICE
- Tighten the M4 screws with a torque not exceeding 1.2 N·m.
- Do not apply organic solvents used with screw locking agents at the locations where the screws are inserted.

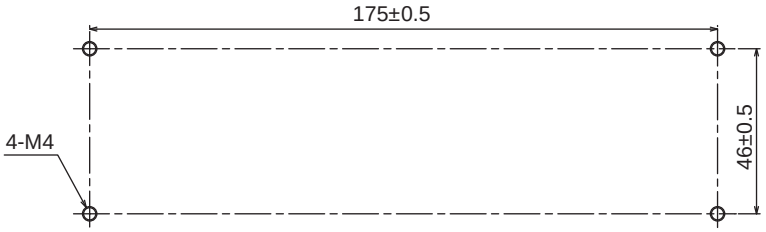
Amplifier Unit

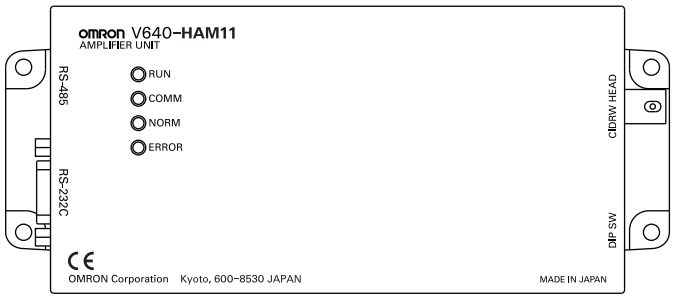
Use spring washers and flat washers with the four M4 screws when mounting the Amplifier Unit.



Mounting dimensions

(Unit: mm)





NOTICE Tighten the M4 screws with a torque not exceeding 1.2 N·m.

CIDRW Head

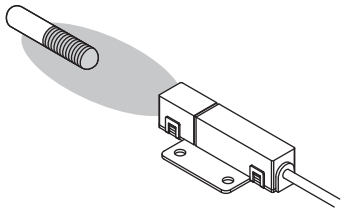
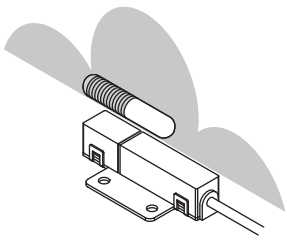
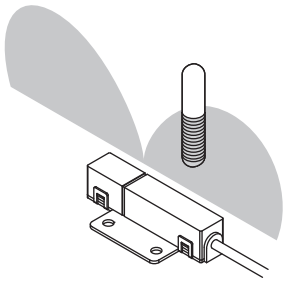
The area for communications with ID Tags varies substantially according to the installation orientations and the background conditions (metals, noise, etc.). Check the communications area before deciding the installation position.

For details on actual communications distances, see *Characteristic Data depending on Conditions of Use* in *Appendix*.

Refer to page 118.

■ Positional Relationship between the CIDRW Head and the ID Tag

The communications area differs according to the positional relationship during communications.

Mounting orientation	Communications area (purely illustrative)	Explanation
Coaxial		The maximum communications area is obtained when the center lines of the CIDRW Head and the ID Tag coincide.
Parallel		The maximum communications area is obtained when the center point of the antenna on the CIDRW Controller is aligned with the center line of the ID Tag.
Vertical		When the center point of the antenna on the CIDRW Head is aligned with the center line of the ID Tag, the communications area is substantially reduced.

■ Data Reading and Writing

The communications distances for reading and writing are not the same; the distance is shorter for writing. Therefore, when data is to be both read and written, take the distance for writing as the reference distance when installing the CIDRW Head and the ID Tag.

■ Influence of Background Metal on ID Tag

Metals in the vicinity of the communications area will affect the range, making it smaller.

Refer to page 124.

■ Influence of Noise

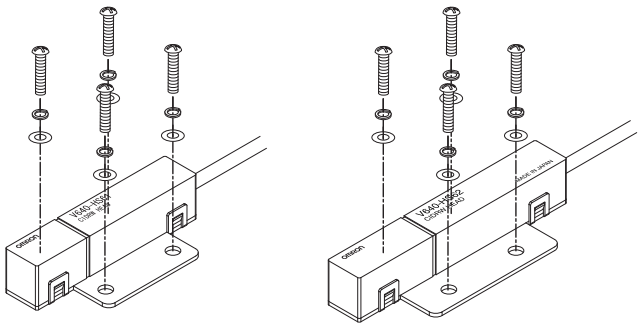
This CIDRW system uses a frequency of 134 kHz for communications with ID Tags. Equipment such as switching power supplies, inverters, servomotors, or monitors in the surrounding area will adversely affect communications, restricting the communications area.

The noise levels in the vicinity of the CIDRW Head can be determined with the environmental NOISE MEASUREMENT command (applies only when SECS is not used). Refer to page 92.

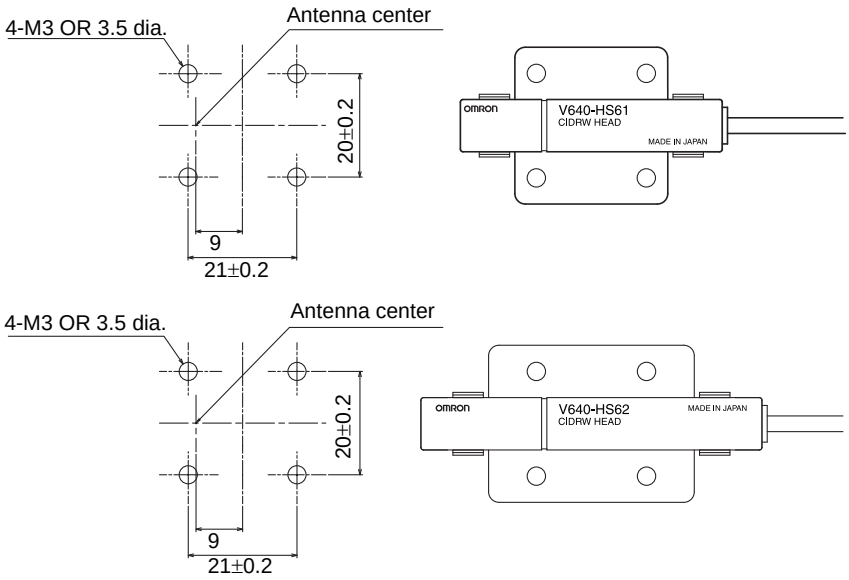
For details on the relationship between noise and communications distance, see *Appendix*. Refer to page 148.

■ Mounting

Use spring washers and flat washers with the four M3 screws when mounting a CIDRW Head.



Mounting dimensions



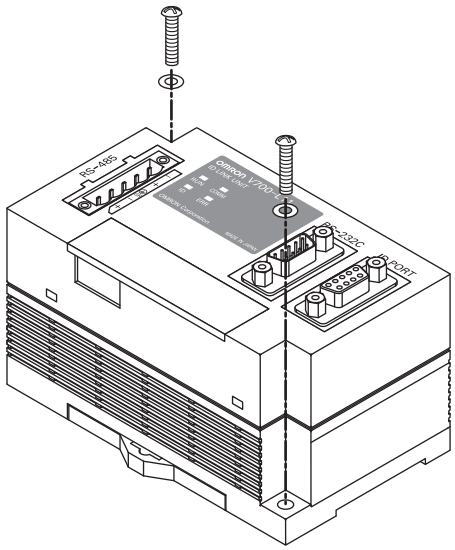
(Unit: mm)

*The mounting dimensions are same between V640-HS61 and V640-HS62.

NOTICE Tighten the M3 screws with a torque not exceeding 0.6 N·m.

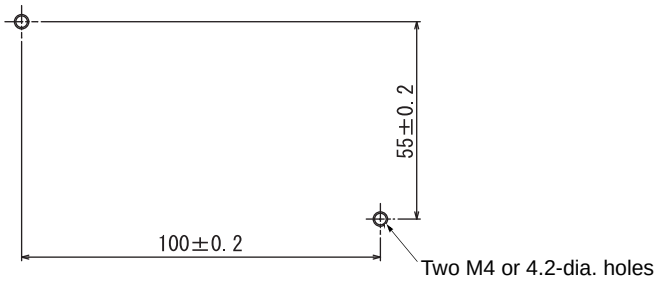
Link Unit

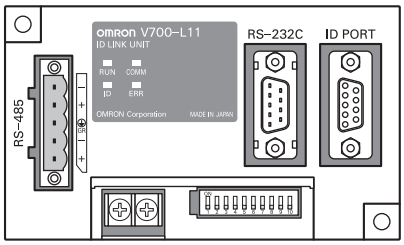
Mount Link Units with the two M4 screws and washers provided as accessories.



Mounting dimensions

(Unit: mm)





NOTICE

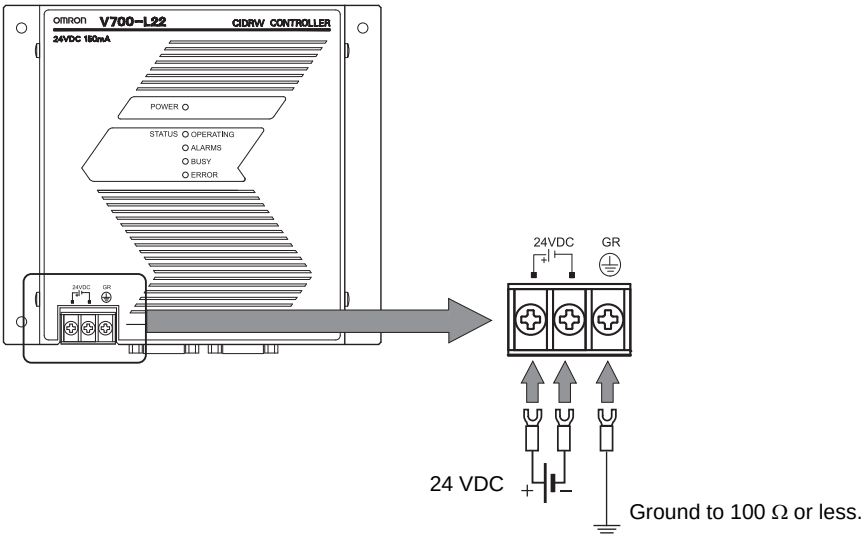
- Tighten the M4 screws with a torque not exceeding 1.2 N·m.
- Do not apply organic solvents used with screw locking agents at the locations where the screws are inserted.

Connections and Wiring

CIDRW Controller

■ Power Supply and Grounding Wires

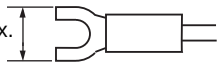
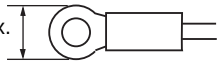
Connect the wires to the 24 VDC power supply terminals and frame ground terminal.



- Crimp Terminals

The terminal screws on the terminal block are M3 size. Use appropriate crimp terminals for M3 screws as shown below.

Crimp Terminals

Shape	Size
Forked	6 mm max. 
Round	6 mm max. 

- Power Supply

Use a power supply that satisfies the following conditions.

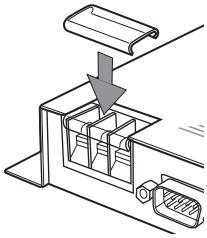
Condition

Power supply voltage	Output current	Safety standard
24 VDC +10%, -15%	500 mA DC min.	UL Class 2

Recommended model

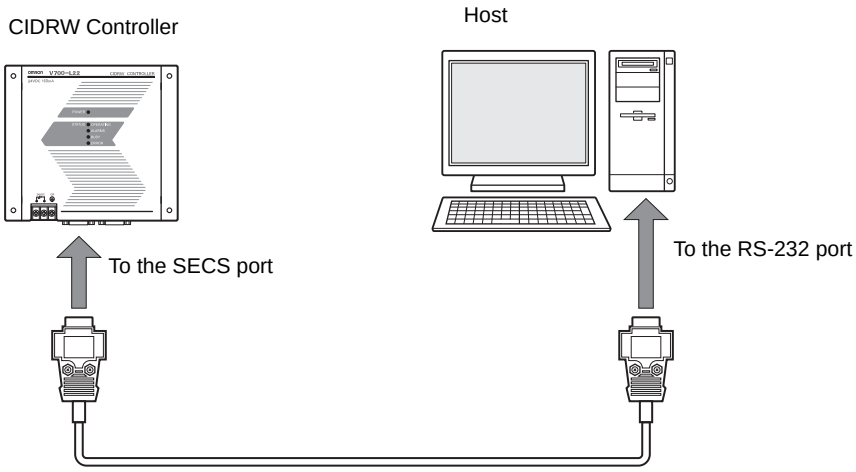
Manufacturer	Model
OMRON	S8VS-01524

NOTICE Be sure to replace the cover after wiring.



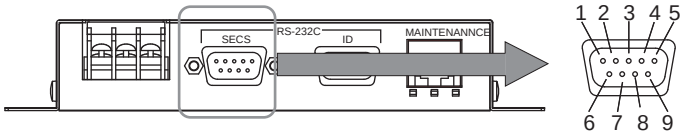
■ SECS Port

The method for wiring for communications with a host device via the SECS port is explained here.



• Connector

The SECS port on the Controller is a D-SUB 9-pin connector. The pin arrangement is shown below.



The connector rim has electrical continuity with the GR (frame ground) in the 24 VDC power supply terminals.

Pin No.	Signal name	Symbol	Signal direction	Remarks
1	—	NC	—	Not connected
2	Receive data	RD	Input	
3	Send data	SD	Output	
4	—	—	Output	Always OFF
5	Signal ground	SG	—	
6	—	—	Input	Use in the open status.
7	Request send	RS	Input	Always ON during normal operation
8	—	NC	—	Not connected
9	—	NC	—	Not connected

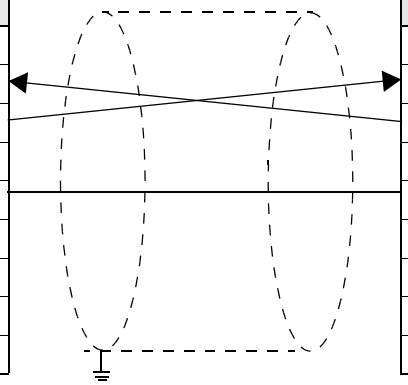
Recommended Models

		Manufacturer	Model
Cable		Hitachi Cable	CO-MA-VV-SB 5PX28AWG
Connector	Socket	OMRON	XM2D-0901
	Hood		XM2S-0913

• Wiring

The cable length should be no greater than 15 m.

CIDRW Controller V700-L22 D-SUB, 9-pin Socket type #4-40	
Name	Pin No.
NC	1
RD	2
SD	3
NC	4
SG	5
NC	6
RS	7
NC	8
NC	9



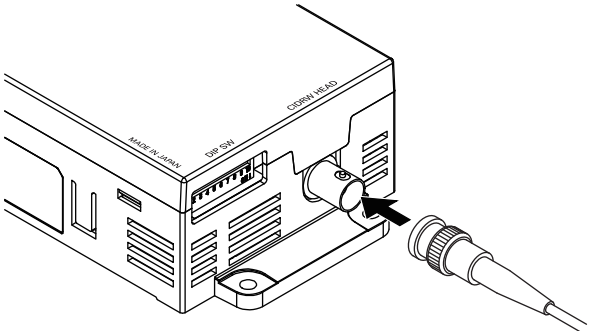
PC/AT Computer D-SUB, 9-pin Socket type #4-40	
Pin No.	Name
1	NC
2	RD
3	SD
4	NC
5	SG
6	NC
7	RS
8	CS
9	NC

Ground shielded wires either at the CIDRW Controller side or at the PC/AT side.

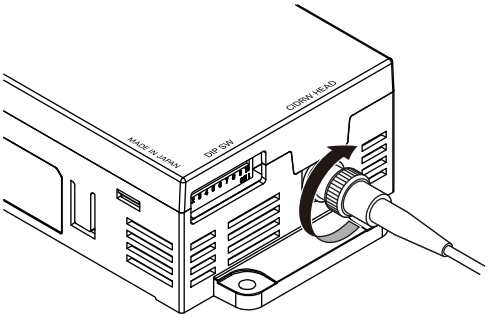
Amplifier Unit

■ Connector for Connecting a CIDRW Head

1. Align the pin on the connector with the channel in the cable connector and insert the cable connector.
   Hold the fixed part of the connector while making this insertion.



2. After inserting the connector fully home, turn the fixed part clockwise to lock it.

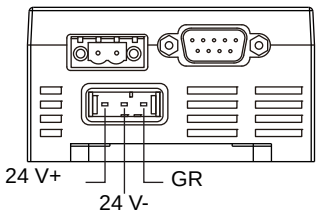


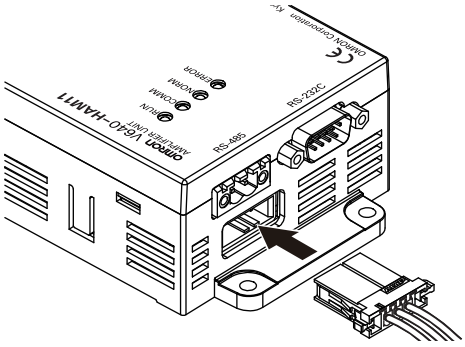
CHECK!

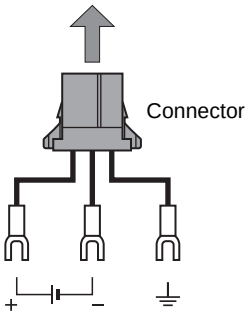
Disconnecting the CIDRW head.
Please pull it straight out after turn a connector counterclockwise and removing a lock.
If it is difficult to pull the connector out , press down on the Amplifier Unit while pulling on the connector.
Please do not pull a cable forcibly.

■ Power Supply and Grounding Wires

Connect the power supply and grounding wires to the dedicated power supply connector.







24 VDC Ground to 100 Ω or less

NOTICE

- The grounding wire should be connected to a ground exclusive to the Amplifier Unit. If the grounding wire is shared with another unit, or connected to a beam in a building, there may be adverse effects.
- Make the grounding point as close as possible and the length of the grounding wire used as short as possible.
- When using the Amplifier Unit in Europe, the connecting cable between the Amplifier Unit and the DC power supply must be 3 m or less.

• Dedicated Power Supply Connector and RS-485 Port Connector

Prepare a V640-A90 (can be purchased as an accessory).

Contents of the V640-A90 set (accessory)

Name	Quantity	When procured individually	
		Manufacturer	Model
Power supply connector	One	Tyco Electronics	1-178288-3
Pins for power supply connector	Three		175217-3
Connector for RS-485 port	One	Phoenix Contact	MSTB2.5/2-STF-5.08

• Dedicated Power Supply Cable

Use an AWG20 to AWG24 cable.

Use a dedicated tool for crimping the cable to the connector pins.

Recommended Crimping Tool

Manufacturer	Model
Tyco Electronics	919601-1

• Power Supply

Use a power supply that satisfies the following conditions.

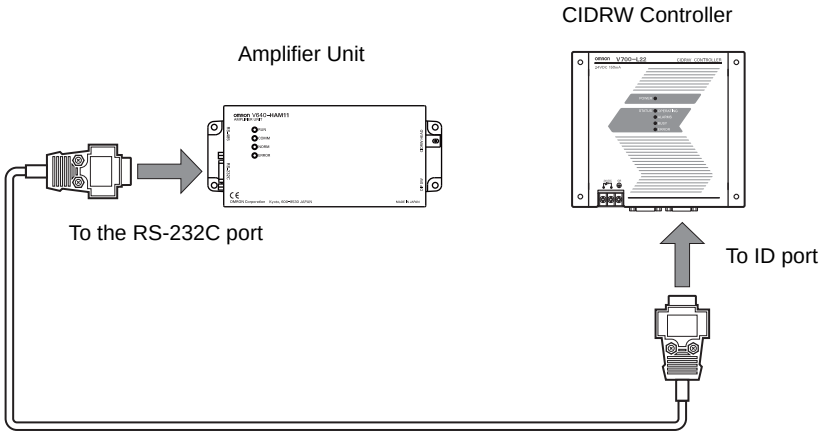
Recommended Product

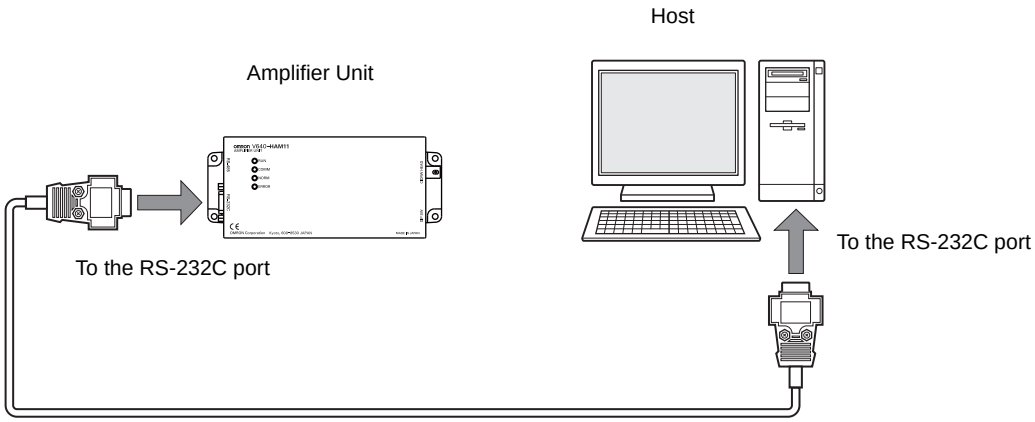
Manufacturer	Model	Output current	Input voltage
OMRON	S8VS-01524	24 VDC, 650 mA	100 to 240 VAC

*The maximum power consumption of the Amplifier Unit is 150 mA at 24 VDC(V640-HAM11-V4), 400 mA at 24 VDC(V640-HAM11-L-V2). The inrush current, however, must be considered when selecting the power supply capacity. A power supply with an output of 650 mA min. at 24 VDC is recommended.

■ RS-232C Port

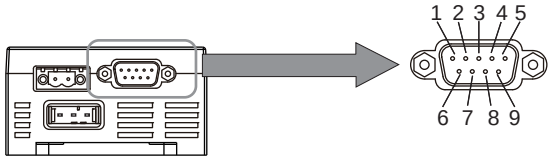
The method for connecting a CIDRW Controller or host device via the RS-232C port is explained here.





• Connector

The RS-232C port of the Amplifier Unit is a D-SUB, 9-pin connector. The pin arrangement is shown below.



The connector rim has electrical continuity with the GR (frame ground) terminal in the dedicated power supply connector.

Pin No.	Signal name	Symbol	Signal direction	Remarks
1	—	NC	—	Not connected
2	Receive data	RD	Input	
3	Send data	SD	Output	
4	—	NC	—	Not connected
5	Signal ground	SG	—	
6	—	NC	—	Not connected
7	Request send	RS	Output	Always ON during normal operation
8	Send enable	CS	Input	
9	—	NC	—	Not connected

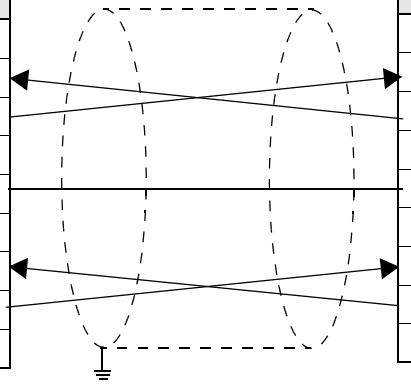
Recommended Models

			Manufacturer	Model
Cable			Hitachi Cable	CO-MA-VV-SB 5PX28AWG
Connector	Host side	Socket	OMRON	XM2D-0901
		Hood		XM2S-0913
	Amplifier Unit side	Socket		XM2D-0901
		Hood		XM2S-0911

• Wiring for Connection to a V700-L22 CIDRW Controller

The cable length should be no greater than 15 m.

Amplifier Unit V640-HAM11-V4 V640-HAM11-L-V2 D-SUB, 9-pin Socket type Metric screw, M2.6	
Name	Pin No.
NC	1
RD	2
SD	3
NC	4
SG	5
NC	6
RS	7
CS	8
NC	9



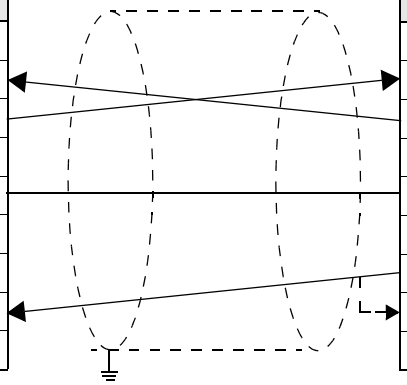
CIDRW Controller V700-L22 D-SUB, 9-pin Socket type #4-40	
Pin No.	Name
1	NC
2	RD
3	SD
4	NC
5	SG
6	NC
7	RS
8	CS
9	NC

Ground shielded wires either at the Amplifier Unit side or at the CIDRW side.

• Wiring for Connection to a PC/AT Computer (9-pin Connector)

The cable length should be no greater than 15 m.

Amplifier Unit V640-HAM11-V4 V640-HAM11-L-V2 D-SUB, 9-pin Socket type Metric screw, M2.6	
Name	Pin No.
NC	1
RD	2
SD	3
NC	4
SG	5
NC	6
RS	7
CS	8
NC	9



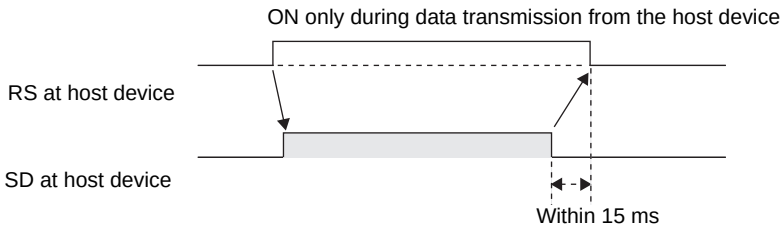
PC/AT Computer D-SUB, 9-pin Socket type #4-40	
Pin No.	Name
1	NC
2	RD
3	SD
4	NC
5	SG
6	NC
7	RS
8	CS
9	NC

Ground shielded wires either at the CIDRW Controller side or at the PC/AT computer side.

CHECK!

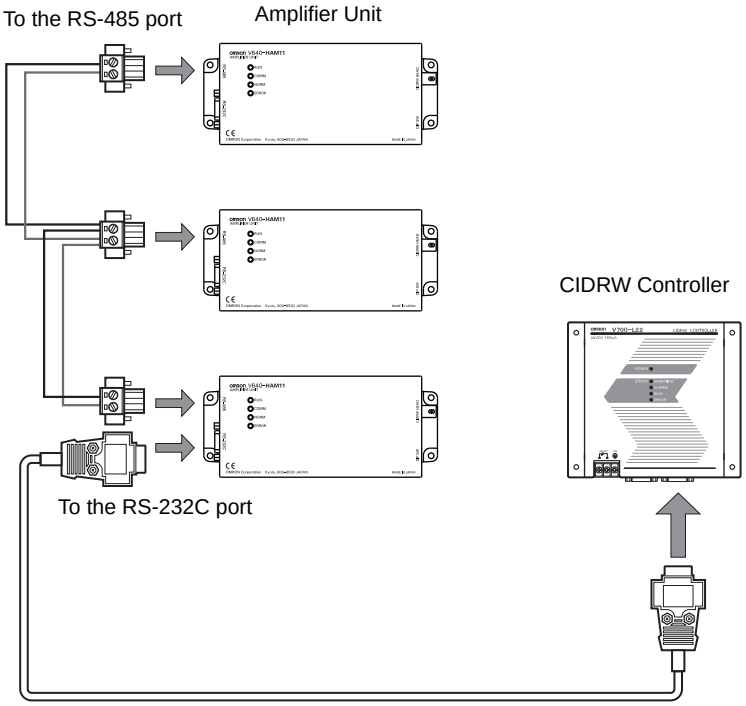
RS signal control method at the host device

In a 1:N connection, the RS signals generated from the host device by normal control must be input as CS signals. Turn the RS signals OFF within 15 ms after the completion of data transmission. Correct communications will not be possible without this control.



■ RS-485 Port

The method for connection to the RS-485 port of another Amplifier Unit when multiple CIDRW Heads are used is explained here.



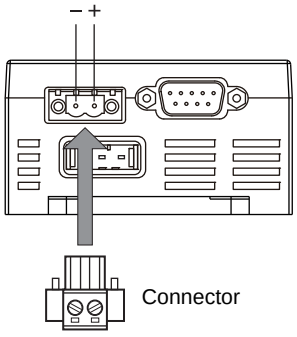
NOTICE The maximum total length of RS-485 cable is 50 m.

• Connector

Prepare a V640-A90 (can be purchased as an accessory) as the connector for the RS-485 port on the Amplifier Unit.

Refer to page 37.

The pin arrangement is shown below.



Name	Function
-	Connect to the minus line of another Amplifier Unit.
+	Connect to the plus line of another Amplifier Unit.

• Cable Information

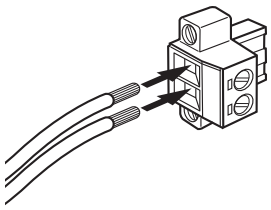
Recommended Models

		Manufacturer	Model
Cable	RS-485 signal wire	Tachii Electric Wire	MVVS 2CX0.5SQ
Crimp terminals	When one wire is connected to each terminal.	Phoenix Contact	AI0.5-8WH
	When two wires are connected to each terminal.		AI-TWIN2×0.5-8WH
Crimping tool			CRIMPFOX UD6

• Wiring Method

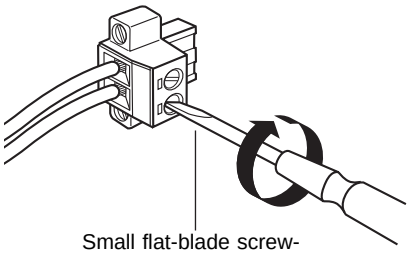
1. Attach crimp terminals to stripped portions of the cables.

2. Insert the wires into the correct holes in the connector, bearing the orientation of the connector in mind.



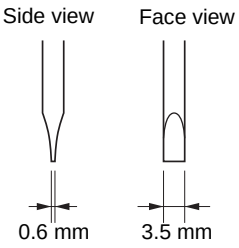
3. Tighten the set screws of the connector firmly to secure the cables.

The appropriate tightening torque is around 0.5 N·m.



Small flat-blade screwdriver with no taper

CHECK! A standard, tapered screwdriver will not enter all the way into the screw holes. Use a small gauge flat-blade screwdriver whose shaft and tip have the same thickness.

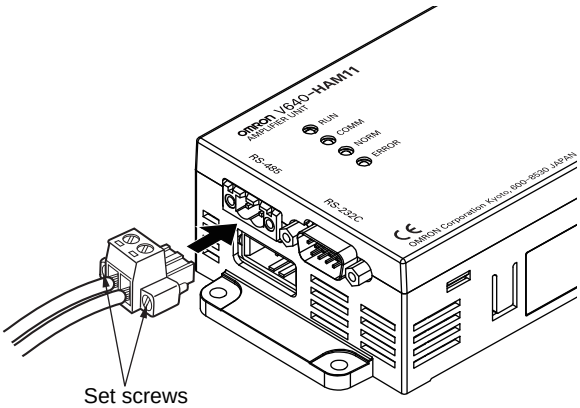


Recommended Screwdriver

Manufacturer	Model
OMRON	XW4Z-00C

4. Having fitted the connector to the cable, connect it to an Amplifier Unit.

Orient the cable connector correctly in relation to the connector on the Amplifier Unit, and fasten the cable connector by fully tightening the retaining screws.



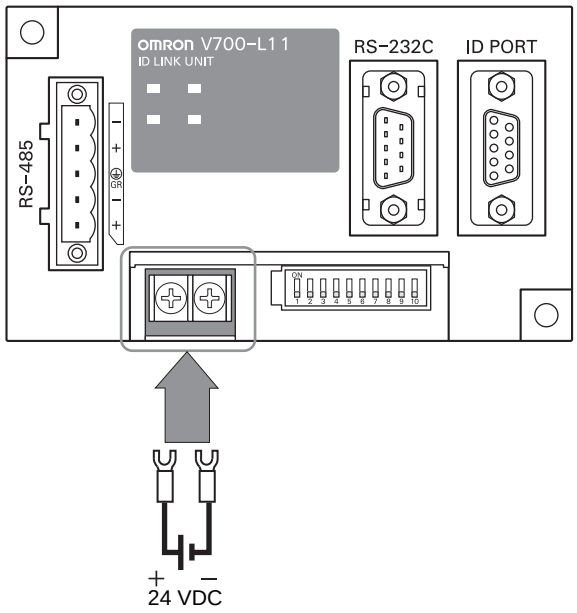
CHECK! Disconnecting the connector

Fully loosen the two screws, then grip the projections on the connector and pull it straight out. If it is difficult to pull the connector out, press down on the Amplifier Unit while pulling on the connector.

Link Unit

■ Power Supply

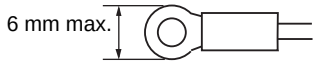
Opening the cover on the top face of the Link Unit exposes the power supply terminals.



• Crimp Terminals

The terminal screws on the terminal block are M3 size. Use appropriate crimp terminals for M3 screws as shown below.

Crimp Terminals

Shape	Size
Forked	
Round	

• Power Supply

Use a power supply that satisfies the following conditions.

Condition

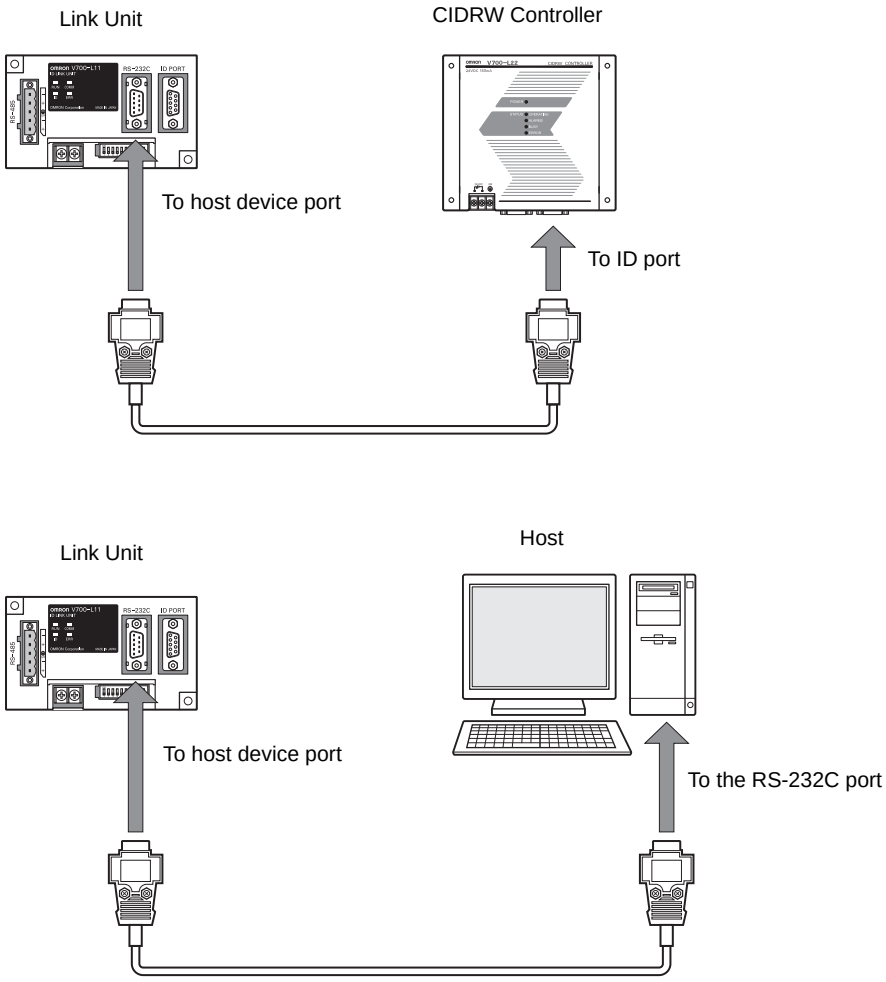
Power supply voltage	Output current	Safety standard
24 VDC +10%, -15%	500 mA DC min.	UL Class 2

Recommended Model

Manufacturer	Model
OMRON	S8VS-01524

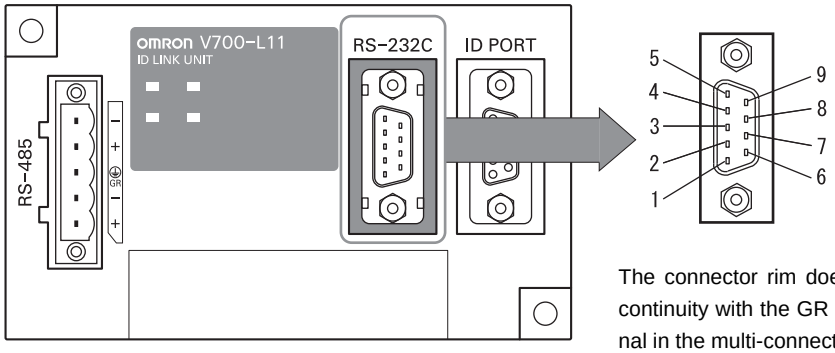
■ Host Connection Port

The method for connecting to a CIDRW Controller or host device via the RS-232C port is explained here.



• Connector

The host device connection port on the Link Unit is a D-SUB, 9-pin connector. The pin arrangement is shown below.



The connector rim does not have electrical continuity with the GR (frame ground) terminal in the multi-connection port.

Pin No.	Signal name	Symbol	Signal direction	Remarks
1	—	NC	—	Not connected
2	Receive data	RD	Input	
3	Send data	SD	Output	
4	—	NC	—	Not connected
5	Signal ground	SG	—	
6	—	NC	—	Not connected
7	Request send	RS	Output	Always ON during normal operation
8	Send enabled	CS	Input	
9	—	NC	—	Not connected

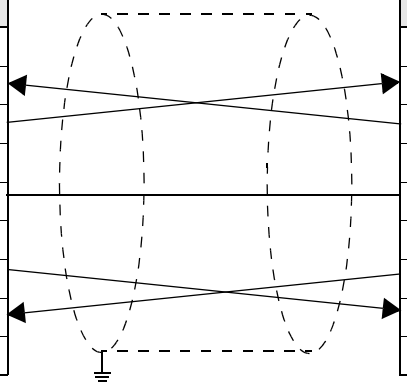
Recommended model

		Manufacturer	Model
Cable		Hitachi Cable	CO-MA-VV-SB 5PX28AWG
Connector	Socket	OMRON	XM2D-0901
	Hood		XM2S-0913

• Wiring for Connection to a CIDRW Controller

The cable length should be no greater than 15 m.

Link Unit V700-L11 D-SUB, 9-pin, female Socket type #4-40		CIDRW Controller V700-L22 D-SUB, 9-pin, female Socket type #4-40	
Name	Pin No.	Pin No.	Name
NC	1	1	NC
RD	2	2	RD
SD	3	3	SD
NC	4	4	NC
SG	5	5	SG
NC	6	6	NC
RS	7	7	RS
CS	8	8	CS
NC	9	9	NC



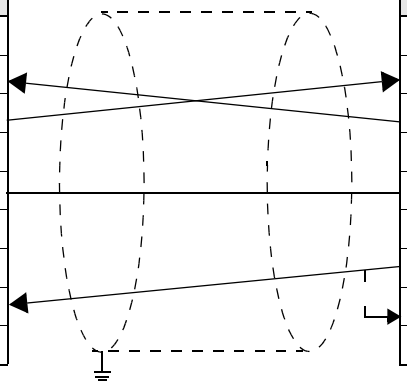
Ground shielded wires at the CIDRW Controller side.

• Wiring for Connection to a PC/AT Computer

If the CS function is to be used at the PC/AT computer side, a return wire is required.

Link Unit V700-L11 D-SUB, 9-pin Socket type #4-40	
Name	Pin No.
NC	1
RD	2
SD	3
NC	4
SG	5
NC	6
RS	7
CS	8
NC	9

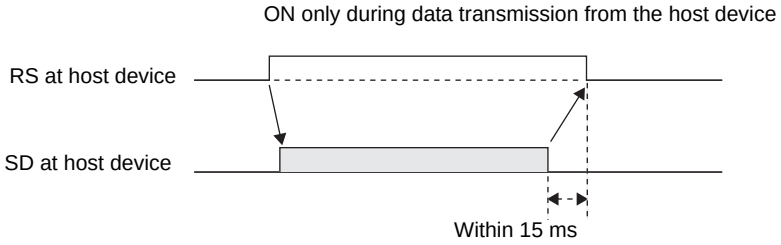
PC/AT Computer D-SUB, 9-pin Socket type #4-40	
Pin No.	Name
1	NC
2	RD
3	SD
4	NC
5	SG
6	NC
7	RS
8	CS
9	NC



Ground shielded wires either at the CIDRW Controller side or at the PC/AT computer side.

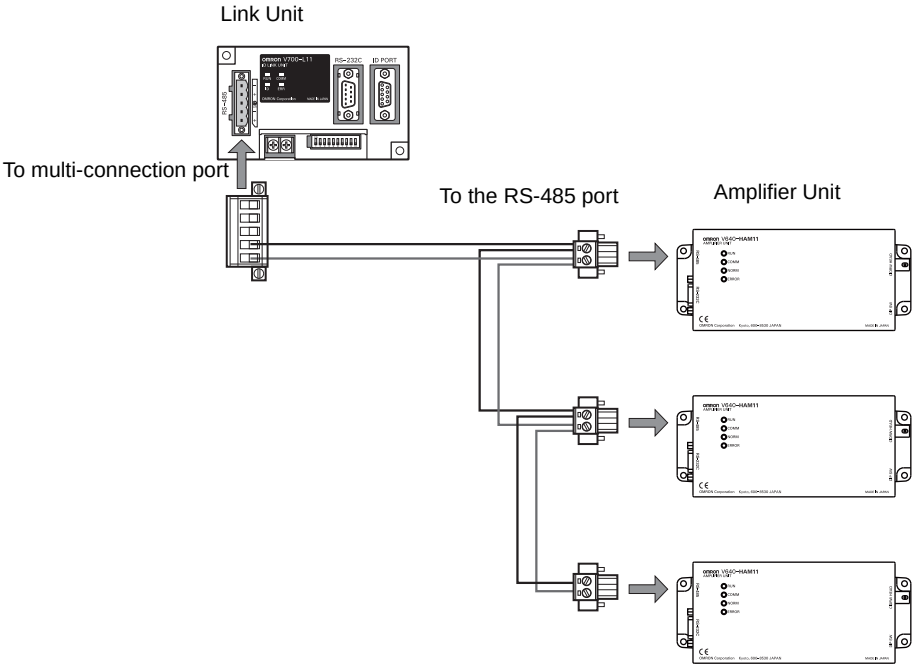
RS signal control method at the host device

In a 1:N system using Link Units, the RS signals generated from the host device by normal control must be input as CS signals. Turn the RS signals OFF within 15 ms after the completion of data transmission. Correct communications will not be possible without this control.

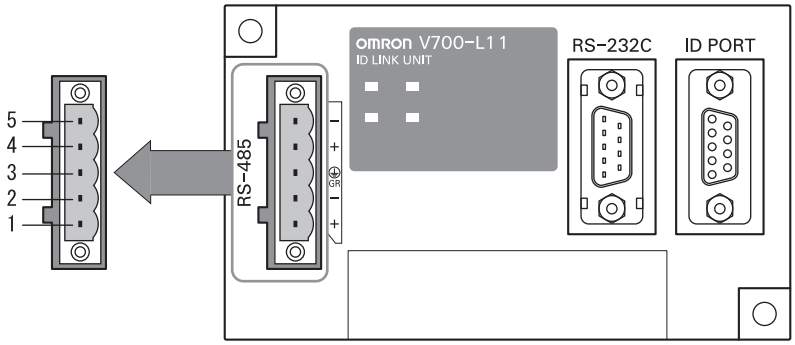


■ Multi-connection Port

The method for connecting to an Amplifier Unit is explained here.



• Connector



Pin No.	Name	Function
5	-	No wiring is required. (Short with terminal 2 within the circuit)
4	+	No wiring is required. (Short with terminal 1 within the circuit)
3	GR	Ground to 100 Ω or less.
2	-	Connect to the minus line of the Amplifier Unit.
1	+	Connect to the plus line of the Amplifier Unit.

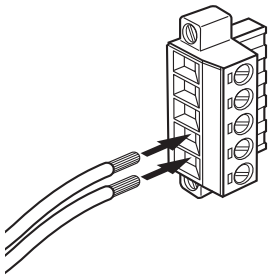
• Cable

Recommended Models

		Manufacturer	Model
Cable	RS-485 signal wire	Tachii Electric Wire	MVVS 2CX0.5SQ
	Frame ground line	AWG22 to AWG20 cable	
Crimp terminals	When one wire is connected to each terminal.	Phoenix Contact	AI0.5-8WH
	When two wires are connected to each terminal.		AI-TWIN2×0.5-8WH
Crimping tool			CRIMPFOX UD6

• Wiring Method

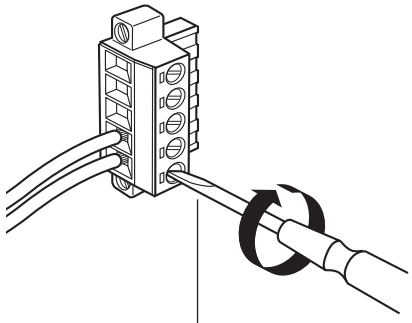
1. Attach crimp terminals to stripped portions of the cables.



2. Insert the wires into the correct holes in the connector, bearing the orientation of the connector in mind.

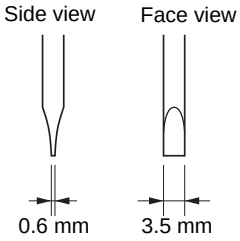
3. Tighten the set screws of the connector firmly to secure the cables.

The appropriate tightening torque is around 0.5 N·m.



Small gauge flat-blade screwdriver with no taper

CHECK! A standard, tapered screwdriver will not enter all the way into the screw holes. Use a small gauge flat-blade screwdriver whose shaft and tip have the same thickness.

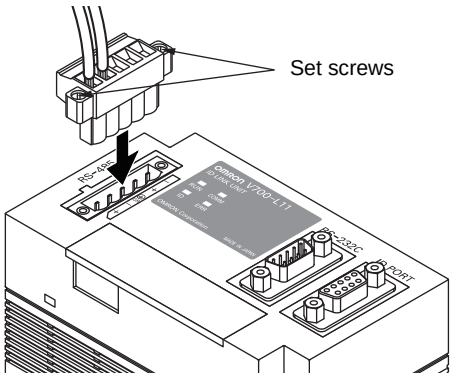


Recommended screwdriver

Manufacturer	Model
OMRON	XW4Z-00C

4. Having fitted the connector to the cable, connect it to the Link Unit.

Orient the cable connector correctly in relation to the connector on the Link Unit, and fasten the cable connector by fully tightening the retaining screws.



CHECK! Disconnecting the connector

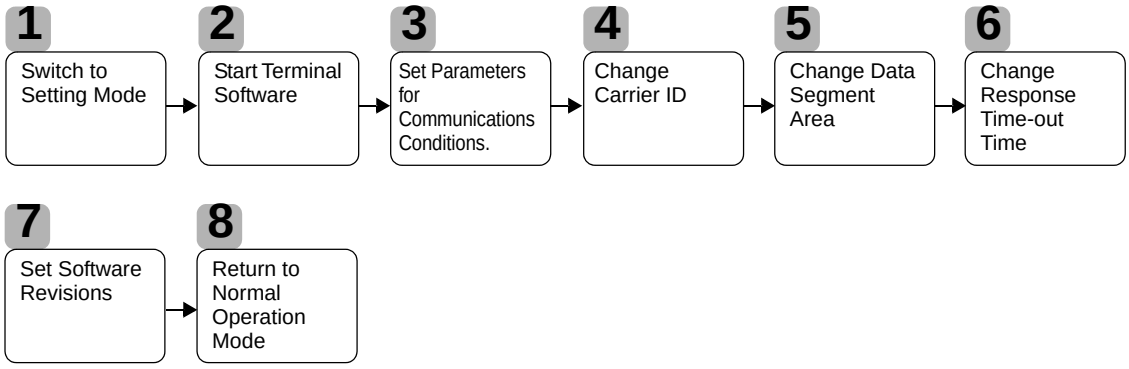
Fully loosen the two screws, then grip the projections on the connector and pull it straight out. If it is difficult to pull the connector out, press down on the Link Unit while pulling on the connector.

SECTION 3
Preparing for Communications

Setting the Communications Conditions for the CIDRW Controller 50
Setting the Communications Conditions for Amplifier Units 63
Setting the Communications Conditions for Link Units 65
Communications Test 66

Setting the Communications Conditions for the CIDRW Controller

Set the communications conditions of the CIDRW Controller only when SECS is used.



1 Switch to Setting Mode

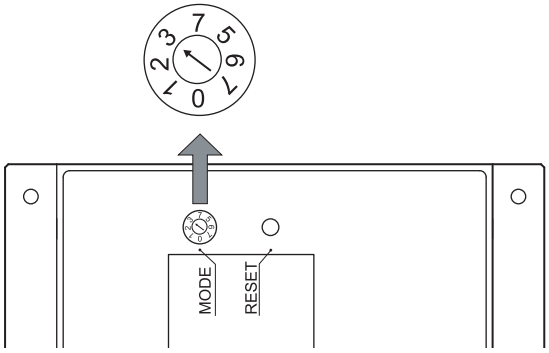
The CIDRW Controller has two operating modes, the Normal Operation mode and the Setting mode. Switch to the Setting mode to set the communications conditions.
There are two methods for switching the mode. Use the one that is appropriate for the circumstances.

■ Changing the Position of the Mode Switch on the Bottom of the Unit

This is the convenient method for setting before mounting the Unit.

1. Turn OFF the power to the CIDRW Controller.

2. Set the mode switch on the bottom of the Unit to 3.



3. When all of the devices to be used are connected, turn the power ON.

The system starts up in the Setting mode, and the indicators react as shown below.

OPERATING	ALARMS	BUSY	ERROR

■ Sending a Switching Command from the Host Device

This method is convenient when the Unit has already been mounted and the switch on the bottom cannot be repositioned to 3.

During operation in the Normal Operation mode, a command is sent from the host device to switch to the Setting mode.

---

1. Send a subsystem command (S18F13 ChangeState CPVAL1 = "PS") from the host device.

Refer to page 79.

CHECK!

CPVAL1="PS" is an expansion designation unique to V700-L22 and does not conform to SEMI standards.

The system is automatically restarted and the mode switches to the Setting mode.
The operation indicators react as shown below.

OPERATING	ALARMS	BUSY	ERROR

2 Start Terminal Software

Use terminal software at the host device to set the CIDRW Controller.

CHECK!

The commands and communications conditions in the setting mode are unique to OMRON. They do not conform to the SEMI standards. For the terminal software, use Hyper Terminal, which is standard with Windows, or a similar program.

The communications conditions for communications between the host device and CIDRW Controller are fixed. Make the following settings using the terminal software.

Item	Setting
Baud rate	9600 bps
Data length	8 bits
Parity	EVEN
Stop bits	1
Communications control	None
Send code	At the end of a line (when [ENTER] is input), the line feed characters ([LF]) are appended.
Display	Local echo

3 Set Parameters for Communications Conditions

Specify the parameters whose settings are to be changed from the terminal software of the host device. The commands, and the parameters that can be set are indicated below.

List of Commands

Designation	Command Input	Explanation
Parameter designation	(Tag name) = (Set value) <CRLF>	Specify the parameter value corresponding to the tag name.
Parameter confirmation	::END	Checks the parameter designations that have been received so far and, if there is no error, confirms the settings.
Comment	# (Comment) <CRLF> or CRLF	This is ignored as the comment line.

Tag Name List

Classification	Parameter	Tag name	Setting range	Default setting
Protocol	Baud Rate	S_BAUD	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 bps	9600 bps
	Device ID	S_DEVID	0 to 32767	0
	Time-out between characters	S_T1	0.1 to 10 s	0.5 s
	Protocol time-out	S_T2	0.2 to 25 s	10 s
	Response time-out	S_T3	1 to 120 s	45 s
	Time-out between blocks	S_T4	1 to 120 s	45 s
	Retry limit	S_RTY	0 to 31	3
	Master/slave	S_MS	M: Master S: Slave	M
SECS	Double block detection yes/no	S_DB	1: The header of the block currently being received is compared with the correct block received immediately before, and double blocks are detected. 0: Double block detection is not performed.	0
	Source ID	S_SRC	0 to 32767	0
	Single block No.	S_BNO	0, 1	1
Operation	Baud rate for communications with Amplifier Unit/Link Unit	C_BAUD	9600, 19200, 38400 bps Use a consistent baud rate setting within the same system configuration.	9600 bps
	Number of Heads count processing	C_HEAD	0 to 31 0: The number of Heads is automatically detected at the start. Any increase or decrease in the number of Heads is automatically detected. 1 to 31: The number of Heads is specified. The number of Heads detected is compared with this specified number of Heads. If the number of Heads changes, for example because a Head fails, an error (with alarm) is detected. If a Head is not connected or an error is detected with a connected Head, so that the number of Heads does not match the specified number, an error (with alarm) is detected.	0

CHECK!

The setting mode commands do not conform to SEMI standards.
For the terminal software, use Hyper Terminal, which is standard with Windows, or a similar program.

1. Specify the parameters to be changed.

When the first parameter is specified, the ALARMS indicator flashes.

```
S_BAUD=19200
S_DEVID=1
S_BNO=0
_
```

2. Confirm the parameter change.

The input parameter is checked and written.

```
::END
_
```

When writing is completed, a message indicating the result is displayed.
The ALARMS indicator lights.

When writing is completed without error

```
SETUP_COMPLETE
_
```

If writing is completed with an error, the parameters are not updated.
The figure in square brackets [ ] indicates the line number where the error was first detected. If a parity error is detected in the received characters, this figure is [0].
Check the sent data based on this information.

When writing is completed with an error

```
SETUP_FAILED [2]_
```

CHECK!

A text file is created based on the data that is keyed in, as shown below, and this data can be conveniently transmitted using the terminal's text file send function.

Example: PRM.TXT

```
#Parameter Setting File for SystemA
#Protocol
S_BAUD=19200
S_DEVID=1
#SECS
S_BNO=0
::END
```

■ Check for Correct Setting

The currently set data can be output so that you can check if it is correct.

1. Send the parameter output command "::GET_PARAM" from the host device.

```
::GET_PARAM
```

The current communications parameter settings are displayed.

```
S_BAUD=19200
S_DEVID=1
S_T1=0.5
S_T2=10.0
S_T3=45
S_T4=3
S_RTY=3
S_MS=M
S_SRC=0
S_BNO=0
C_BAUD=9600
C_HEAD=0
::END
_
```


4 Change Carrier ID

To read the carrier ID, the CID has to be specified within the area where the carrier ID can be set (CarrierIDField) within the ID Tag memory. This section explains the procedure for setting the carrier ID offset (attribute name: CarrierIDOffset) and the carrier ID size (bytes) (attribute name: CarrierIDLength) in the memory map of the ID Tag.
The commands, and the parameters that can be set, are given below.

List of Commands

Designation	Command input	Explanation
Parameter designation	(Tag name) = (Set value) <CRLF>	Specify the parameter value corresponding to the tag name.
Parameter confirmation	::END	Checks the parameter designations that have been received so far and, if there is no error, confirms the settings.
Comment	# (Comment) <CRLF> or CRLF	This is ignored as the comment line.

Tag Name List

Parameter	Tag name	Setting range	Default setting
Carrier ID offset	CIDOF	0 to 15	0
Carrier ID size (bytes)	CIDLN	01 to 16	16

CHECK!

- Settings that exceed the carrier ID area (*) cannot be made. If such a setting is made, an error occurs.
  *: (CIDOF+CIDLN) ≤ T_CIDLEN
- The Carrier ID offset and carrier ID size (bytes) can only be changed in the L22 mode. They cannot be changed in the L21 mode. When you change from the L22 mode to the L21 mode, the carrier ID offset and carrier ID size (bytes) are returned to their initial settings.

1. Specify the parameters to be changed.

When the first parameter is specified, the ALARMS indicator flashes.

```
CIDOF=0
CIDLN=16
```

2. Confirm the parameter change.

The input parameter is checked and written.

```
::END
_
```

■ Check for Correct Setting

The currently set data can be output so that you can check if it is correct.

1. Send the parameter output command "::GET_E99SYS" from the host device.

```
::GET_E99SYS
```

The carrier ID settings are displayed.

```
RT=10.0
CT=0.1
RTY=3
DINST=
MENT=
MODEL=L22
HREV=001.04
CIDOF=00
CIDLN=16
::END
_
```

NOTICE Do not change operation parameters other than RT, CIDOF, and CIDLN. This can cause the system to stop operating correctly.

5 Change Data Segment Area

The data segment area (memory map) must be changed to communicate with ID Tags (RI-TRP-DR2B(-30), made by Texas Instruments). The procedure for changing the data segment area is explained here.

ID Tag Memory Maps Refer to page 149.

The commands, and the parameters that can be set, are indicated below.

List of Commands

Designation	Command input	Explanation
Parameter designation	(Tag name) = (Set value) <CRLF>	Specify the parameter value corresponding to the tag name.
Parameter confirmation	::END	Checks the parameter designations that have been received so far and, if there is no error, confirms the settings.
Comment	# (Comment) <CRLF> or CRLF	This is ignored as the comment line.

Tag Name List

Parameter	Tag name	Setting range	Default setting
Number of bytes in the carrier ID	T_CIDLEN	16 (fixed) The setting must maintain the following relationship (CIDOF + CIDLN) ≤ T_CIDLEN	16
Segment name	T_SEGN	"S01" to "S99"	"S01" to "S28"
Number of bytes in a segment	T_SEGL	8 (fixed)	8

1. The form of the input from the host device is shown in the figure to the right.

When the first parameter is specified, the ALARMS indicator flashes.

```
T_CIDLEN=16
T_SEGN=S01
T_SEGL=8
T_SEGN=S02
T_SEGL=8
T_SEGN=S03
T_SEGL=8
T_SEGN=S04
T_SEGL=8
T_SEGN=S05
T_SEGL=8
T_SEGN=S06
T_SEGL=8
T_SEGN=S07
T_SEGL=8
T_SEGN=S08
T_SEGL=8
T_SEGN=S09
T_SEGL=8
T_SEGN=S10
T_SEGL=8
T_SEGN=S11
T_SEGL=8
T_SEGN=S12
T_SEGL=8
T_SEGN=S13
T_SEGL=8
T_SEGN=S14
T_SEGL=8
T_SEGN=S15
T_SEGL=8
_
```

2. Confirm the parameter change.

The input parameter is checked and written.

```
::END
_
```

When writing is completed, a message indicating the result is displayed. The ALARMS indicator lights.

When writing is completed without error

```
SETUP_COMPLETE
_
```

If writing is completed with an error, the parameters are not updated. The figure in square brackets [ ] indicates the line number where the error was first detected. If a parity error is detected in the received characters, this figure is [0].
Check the sent data based on this information.

When writing is completed with an error

```
SETUP_FAILED [2]_
```

■ Check for Correct Setting

The currently set data can be output so that you can check if it is correct.

1. Send the parameter output command "::GET_SEG" from the host device.

```
::GET_SEG
```

The data segment area is displayed.

```
T_CIDLEN=16
T_SEGN=S01
T_SEGL=8
T_SEGN=S02
T_SEGL=8
T_SEGN=S03
T_SEGL=8
T_SEGN=S04
T_SEGL=8
T_SEGN=S05
T_SEGL=8
T_SEGN=S06
T_SEGL=8
T_SEGN=S07
T_SEGL=8
T_SEGN=S08
T_SEGL=8
T_SEGN=S09
T_SEGL=8
T_SEGN=S10
T_SEGL=8
T_SEGN=S11
T_SEGL=8
T_SEGN=S12
T_SEGL=8
T_SEGN=S13
T_SEGL=8
T_SEGN=S14
T_SEGL=8
T_SEGN=S15
T_SEGL=8
::END
_
```

6 Change Response Time-out Time

In the initial settings of the CIDRW Controller, when ID Tag (RI-TRP-DR2B(-30), made by Texas Instruments) data is read or written, a response time-out may occur. Be sure to set the response time-out time to 10 s.
The commands, and the parameters that can be set are indicated below.

List of Commands

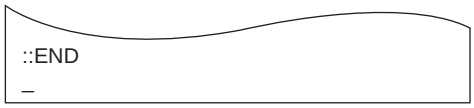
Designation	Command input	Explanation
Parameter designation	(Tag name) = (Set value) <CRLF>	Specify the parameter value corresponding to the tag name.
Parameter confirmation	::END	Checks the parameter designations that have been received so far and, if there is no error, confirms the settings.
Comment	# (Comment) <CRLF> or CRLF	This is ignored as the comment line.

Tag Name List

Parameter	Tag name	Setting range	Default setting
Response time-out time	RT	10.0 (fixed)	2.5

1. Set the response time-out time to 10.0.

2. Confirm the parameter change.
The input parameter is checked and written.

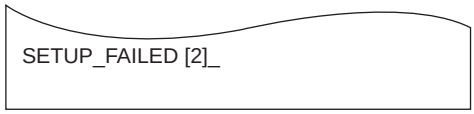


When writing is completed, a message indicating the result is displayed.
The ALARMS indicator lights.

When writing is completed without error

If writing is completed with an error, the parameters are not updated.
The figure in square brackets [ ] indicates the line number where the error was first detected. If a parity error is detected in the received characters, this figure is [0].
Check the sent data based on this information.

When writing is completed with an error



■ Check for Correct Setting

The currently set data can be output so that you can check if it is correct.

1. Send the parameter output command "::GET_E99SYS" from the host device.

```
::GET_E99SYS
```

The current operation parameter settings are displayed.

```
RT=10.0
CT=0.1
RTY=3
DINST=
MENT=
MODEL=L22
HREV=001.04
CIDOF=00
CIDLN=16
::END
_
```

NOTICE Do not change operation parameters other than RT, CIDOF, and CIDLN.
This can cause the system to stop operating correctly.

7 Set Software Revisions

The operations of the V700-L22 can be changed to match those of the previous model, the V700-L21. The commands, and the parameters that can be set are indicated below.

List of Commands

Designation	Command input	Explanation
Parameter designation	(Tag name) = (Set value) <CRLF>	Specify the parameter value corresponding to the tag name.
Parameter confirmation	::END	Checks the parameter designations that have been received so far and, if there is no error, confirms the settings.
Comment	# (Comment) <CRLF> or CRLF	This is ignored as the comment line.

Tag Name List

Parameter	Tag name	Setting range	Default setting
Software revision	RVER	2.00: in V700-L22 mode 1.10: in V700-L21 mode	2.00

1. Specify the parameters to be changed.
When the first parameter is specified, the ALARMS indicator flashes.

```
RVER=1.10
```

2. Confirm the parameter change.
The input parameter is checked and written.

```
::END
_
```

■ Check for Correct Setting

The currently set data can be output so that you can check if it is correct.

1. Send the parameter output command "::GET_VER" from the host device.

```
::GET_VER
```

The software revision settings are displayed.

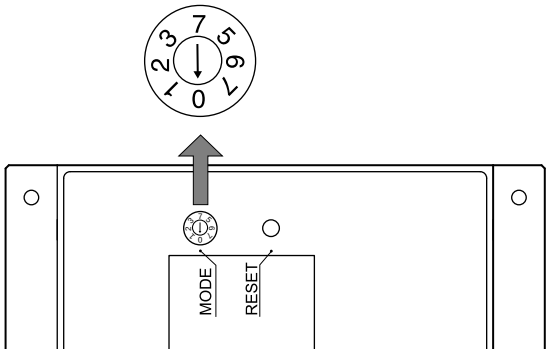
```
RVER=1.10
::END
_
```


8 Return to Normal Operation Mode

■ When the Mode is Selected with the Mode Switch on the Bottom of the Unit

1. Turn OFF the power to the CIDRW Controller.

2. Set the mode switch on the bottom of the Unit to the 0.



3. When all of the devices to be used are connected, turn the power ON.
Start up in the Normal Operation mode.

CHECK!

Even if you restart with the mode switch left at the 3 position, or send a reset command "::EXIT," the Controller will start in the Setting mode. To switch to Normal Operation mode, you must set the mode switch to 0.

■ When the Mode Is Selected by a Command Sent from the Host Device

1. Either send the reset command "::EXIT" from the host device or turn the power to the CIDRW Controller OFF and then back ON.
Start up in the Normal Operation mode.

```
::EXIT
_
```

Reference:

List of Commands

Designation	Command input	Explanation
Parameter designation	(Tag name) = (Set value) <CRLF>	Specify the parameter value corresponding to the tag name.
Parameter confirmation	::END	Checks the parameter designations that have been received so far and, if there is no error, confirms the settings.
Comment	# (Comment) <CRLF> or CRLF	This is ignored as the comment line.
Parameter output	::GET_PARAM	Outputs the set parameters (protocol, SECS, operation).
	::GET_SEG	Outputs the set parameters (ID Tag memory map).
	::GET_E99SYS	Outputs the set parameters (operations).
	::GET_VER	Outputs the set parameters (software revision).
RESET	:EXIT	Restarts the CIDRW Controller.

Tag Name List

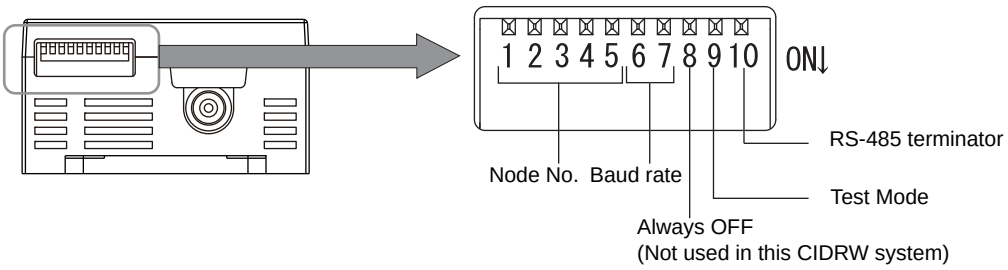
Classification	Parameter	Tag name	Setting range	Default setting
Protocol	Baud Rate	S_BAUD	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200 bps	9600 bps
	Device ID	S_DEVID	0 to 32767	0
	Time-out between characters	S_T1	0.1 to 10 s	0.5 s
	Protocol time-out	S_T2	0.2 to 25 s	10 s
	Response time-out	S_T3	1 to 120 s	45 s
	Time-out between blocks	S_T4	1 to 120 s	45 s
	Retry limit	S_RTY	0 to 31	3
	Master/slave	S_MS	M: Master S: Slave	M
SECS	Double block detection yes/no	S_DB	1: The header of the block currently being received is compared with the correct block received immediately before, and double blocks are detected. 0: Double block detection is not performed.	0
	Source ID	S_SRC	0 to 32767	0
	Single block No.	S_BNO	0, 1	1
Operation	Baud rate for communications with Amplifier Unit/Link Unit	C_BAUD	9600, 19200, 38400 bps Use a consistent baud rate setting within the same system configuration.	9600 bps
	Number of Heads count processing	C_HEAD	0 to 31 0: The number of Heads is automatically detected at the start. Any increase or decrease in the number of Heads is automatically detected. 1 to 31: The number of Heads is specified. The number of Heads detected is compared with this specified number of Heads. If the number of Heads changes, for example because a Head fails, an error (with alarm) is detected. If a Head is not connected or an error is detected with a connected Head, so that the number of Heads does not match the specified number, an error (with alarm) is detected.	0
ID Tag	Number of bytes in the carrier ID	T_CIDLEN	16 (fixed)	16
	Segment name	T_SEGN	“S01” to “S99”	“S01” to “S28”
	Number of bytes in a segment	T_SEGL	8 (fixed)	8

Tag Name List

Classification	Parameter	Tag name	Setting range	Default setting
E99	Response timeout time	RT	10.0 s (fixed)	2.5 s
	Carrier ID offset	CIDOF	00 to 15	00
	Carrier ID length	CIDLEN	01 to 16	16

Setting the Communications Conditions for Amplifier Units

Set the communications conditions using the DIP switches on the side face of the Amplifier Unit.
After changing the DIP switch settings, restart the system. The new settings will not become effective until the system is restarted.



Node No.

Node No.	DIP-SW				
	1	2	3	4	5
01	OFF	OFF	OFF	OFF	OFF
02	ON	OFF	OFF	OFF	OFF
03	OFF	ON	OFF	OFF	OFF
04	ON	ON	OFF	OFF	OFF
05	OFF	OFF	ON	OFF	OFF
06	ON	OFF	ON	OFF	OFF
07	OFF	ON	ON	OFF	OFF
08	ON	ON	ON	OFF	OFF
09	OFF	OFF	OFF	ON	OFF
10	ON	OFF	OFF	ON	OFF
11	OFF	ON	OFF	ON	OFF
12	ON	ON	OFF	ON	OFF
13	OFF	OFF	ON	ON	OFF
14	ON	OFF	ON	ON	OFF
15	OFF	ON	ON	ON	OFF
16	ON	ON	ON	ON	OFF

Node No.	DIP-SW				
	1	2	3	4	5
17	OFF	OFF	OFF	OFF	ON
18	ON	OFF	OFF	OFF	ON
19	OFF	ON	OFF	OFF	ON
20	ON	ON	OFF	OFF	ON
21	OFF	OFF	ON	OFF	ON
22	ON	OFF	ON	OFF	ON
23	OFF	ON	ON	OFF	ON
24	ON	ON	ON	OFF	ON
25	OFF	OFF	OFF	ON	ON
26	ON	OFF	OFF	ON	ON
27	OFF	ON	OFF	ON	ON
28	ON	ON	OFF	ON	ON
29	OFF	OFF	ON	ON	ON
30	ON	OFF	ON	ON	ON
31	OFF	ON	ON	ON	ON
1:1 protocol	ON	ON	ON	ON	ON

Always set node numbers that are unique within the system configuration. When SECS is used, the node number set here is "HeadID(E99)."

Baud Rate

Option	DIP-SW		Description
	6	7	
38400 bps	ON	ON	Use a consistent baud rate setting within the same system configuration.
19200 bps	OFF	ON	
9600 bps (default setting)	OFF	OFF	
4800 bps	ON	OFF	

Test Mode

Test Mode	DIP-SW	Description
	9	
Enabled	ON	Set the Test Mode and then restart the Amplifier Unit to make the setting effective.
Disabled	OFF	

Refer to page 19.

RS-485 Terminator

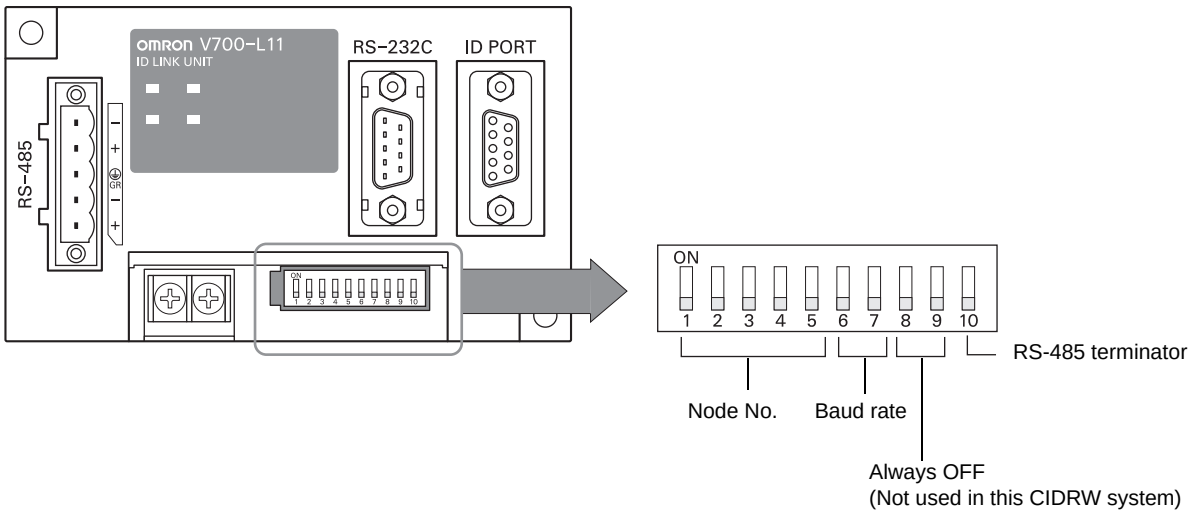
Option	DIP-SW	Description
	10	
Invalid	OFF	Set ON at both of the end Units in a multidrop system, and OFF at all the other Units. If there is only one Unit, set ON. If there is a possibility that one of multiple Amplifier Units in use may be used independently, turn the terminators of all the Amplifier Units OFF and fit external terminators close to the Units at both ends.
Valid	ON	

Communications Conditions

Item		Specifications				
Standard conformed to		RS-232C				
Communications control protocol		1:N protocol exclusive to OMRON				
Synchronization method		Start-stop synchronization				
Baud rate		Set using a DIP switch				
Frame composition		Start bit	Data bits	Parity bit	Stop bit	Total
	1:N protocol	1	8	None	1	10
	1:1 protocol	1	8	Even	1	11
Error detection	1:N protocol	FCS (frame check sequence)				
	1:1 protocol	Vertical parity				

Setting the Communications Conditions for Link Units

Set the communications conditions by setting the DIP switches.



Node No. (fixed)

DIP-SW				
1	2	3	4	5
ON	ON	ON	ON	ON

CHECK!

The node numbers for Link Units are fixed. Check that DIP switches 1to 5 are all ON.

Baud Rate

Option	DIP-SW		Description
	6	7	
38400 bps	ON	ON	Use a consistent baud rate setting within the same system configuration.
19200 bps	OFF	ON	
9600 bps (default setting)	OFF	OFF	
4800 bps	ON	OFF	

RS-485 Terminator

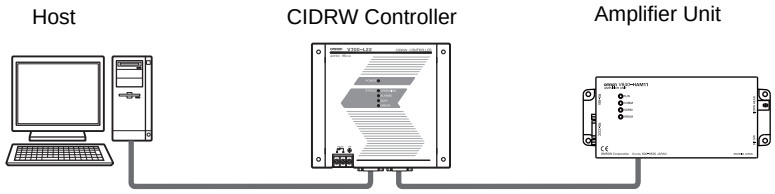
Option	DIP-SW	Description
	10	
Invalid	OFF	Set ON.
Valid	ON	

Communications Test

Communications Test with the Host Device

Check if the host device, CIDRW Controller, and Amplifier Units are correctly connected.

■ When SECS Is Used



- Connection between host device and CIDRW Controller

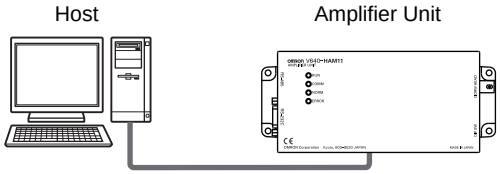
  Send **Are You There Request** message "S1, F1" from the host device.
  If it is correctly connected, **On Line Data** “S1, F2” will be sent from the CIDRW Controller.

- Connection between the CIDRW Controller and Amplifier Unit

  The connection between the CIDRW Controller and Amplifier Unit is checked automatically. If they are connected correctly, the operation indicators on the CIDRW Controller light in the manner shown below.

POWER	OPERATING	ALARMS	BUSY	ERROR
☼	☼	●	●	●

■ When SECS Is Not Used



Node No.1 is tested with the data 12345678.

• 1:1 Protocol

Command

Command code		Test data								CR
		Data 1		Data 2		Data 3		Data 4		
1	0	1	2	3	4	5	6	7	8	0Dh

Response

Response code		Test data								CR
		Data 1		Data 2		Data 3		Data 4		
0	0	1	2	3	4	5	6	7	8	0Dh

• 1:N Protocol

Command

SOH	Node No.		Command code		Test data								FCS		CR
					Data 1		Data 2		Data 3		Data 4				
01h	0	1	1	0	1	2	3	4	5	6	7	8	0	8	0Dh

Response

SOH	Node No.		Response code		Test data								FCS		CR
					Data 1		Data 2		Data 3		Data 4				
01h	0	1	0	0	1	2	3	4	5	6	7	8	0	9	0Dh

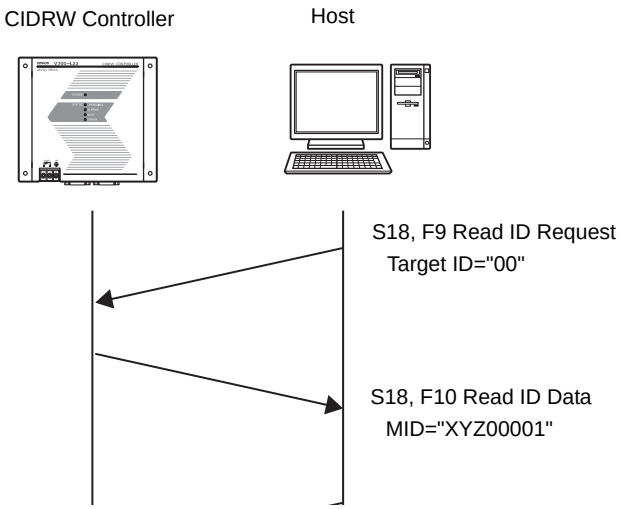
Communications Test between ID Tags and CIDRW System

Send a command from the host device and check that normal communications with the ID Tag is possible.

■ When SECS Is Used

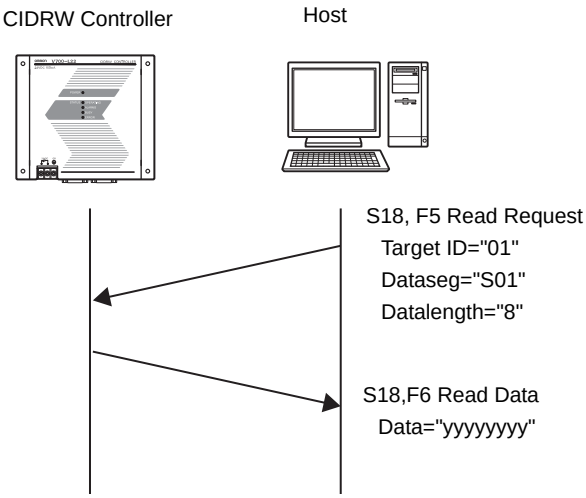
• Read ID

The host device sends a **Read ID Request** message to the CIDRW Controller for Head 1. The CIDRW Head 1 reads the ID, and the CIDRW Controller returns the ID to the host device.



• Read Data

The host device sends a **Read Data Request** message to the CIDRW Controller for Head 1, DataSeg S01 and Datalength 8. The CIDRW Head 1 reads the data, and the CIDRW Controller returns the data to the host device.

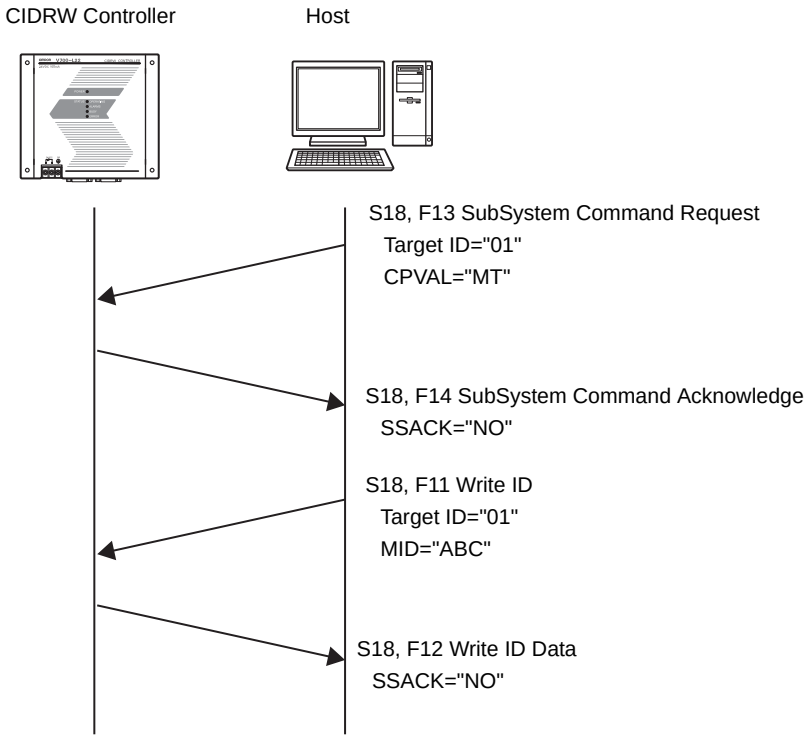


• Write ID

(1) The CIDRW Controller is in IDLE. The host device requests the CIDRW Controller change its operational status to MAINTENANCE.

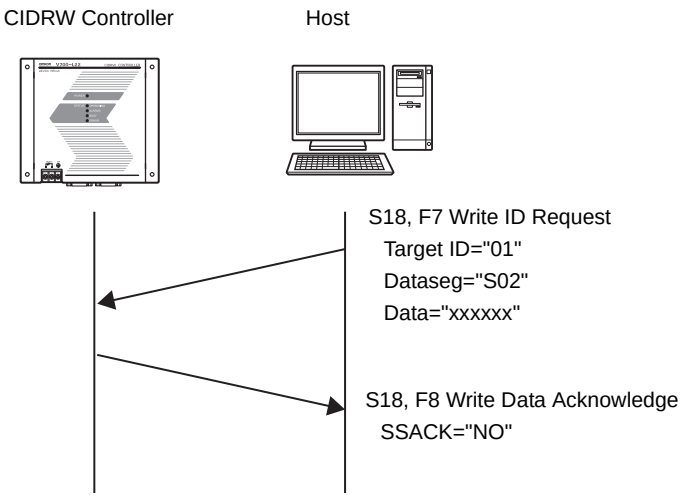
(2) The CIDRW Controller changes to MAINTENANCE and replies that it has changed state.

(3) The host device sends a **Write ID Request** message to the CIDRW Controller for Head 1. The CIDRW Head 1 writes ID, and the CIDRW Controller returns the ID to the host devices.



• Write Data

The host device sends a **Write Data Request** message to the CIDRW Controller for Head 1 and DataSeg S02. The CIDRW Head 1 writes the data, and the CIDRW Controller returns the results to the host device.



■ When SECS Is Not Used

• Read

Reading the page 1 and page 3 data of node No.1:

Data content of the ID Tag

Page 1	12h	34h	56h	78h	90h	12h	34h	56h
Page 2								
Page 3	11h	22h	33h	44h	55h	66h	77h	88h
Page 4								

Command

SOH	Node No.		Command code				Page designation								FCS		CR
01h	0	1	0	1	0	0	0	0	0	0	0	0	1	4	0	5	0Dh

Binary notation

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0

Response

SOH	Node No.		Response code		Page 1																Page 3												FCS		CR
01h	0	1	0	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	0	7	0Dh

• Write

Writing data to page 8 and page 10 of node No.1:

Command

| SOH | Node No. | | Command code | | | | Page designation | | | | | | | | | | | | | | | | | | |

SECTION 4
Reading from/Writing to ID Tags

When SECS Is Used 72

- Online Check 74
- Get Attributes 74
- Set Attributes 75
- Read Data 76
- Write Data 77
- Read ID 78
- Write ID 78
- Subsystem Command (ChangeState) 79
- Subsystem Command (GetStatus) 80
- Subsystem Command (PerformDiagnostics) 80
- Subsystem Command (Reset) 81

When SECS Is Not Used 83

- READ 86
- WRITE 87
- SAME WRITE 89
- BYTE WRITE 90
- TEST 91
- NAK 92
- GET PARAMETER 92
- GET LAST COMMAND 94
- GET COMMUNICATIONS HISTORY 95
- CLEAR COMMUNICATIONS HISTORY 96
- NOISE MEASUREMENT 96
- RESET 96

When SECS Is Used

CHECK!

The SEMI standards are subject to revision. You must refer to the actual standards.

- SEMI E99 THE CARRIER ID READER/WRITER FUNCTIONAL STANDARD
- SEMI E5 EQUIPMENT COMMUNICATION STANDARD 2 MESSAGE CONTENT (SECS II)
- SEMI E4 EQUIPMENT COMMUNICATION STANDARD 1 MESSAGE TRANSFER (SECS I)

SECS Protocol Specifications Refer to page 151.

Message Specifications

List of Messages Used

Classification	S	F	Direction	SECS II names	See
General purpose messages	1	1	S,H→E,reply	Are You There Request	p.74
	1	2	S,H←E	On Line Data	p.74
CIDRW system messages	18	1	S,H→E,reply	Read Attribute Request	p.74
	18	2	S,H←E	Read Attribute Data	p.74
	18	3	S,H→E,reply	Write Attribute Request	p.75
	18	4	S,H←E	Write Attribute Acknowledge	p.75
	18	5	S,H→E,reply	Read Request	p.76
	18	6	S,H←E	Read Data	p.76
	18	7	S,H→E,reply	Write Request	p.77
	18	8	S,H←E	Write Acknowledge	p.77
	18	9	S,H→E,reply	Read ID Request	p.78
	18	10	S,H←E	Read ID Data	p.78
	18	11	S,H→E,reply	Write ID Request	p.78
	18	12	S,H←E	Write ID Acknowledge	p.78
	18	13	S,H→E,reply	Subsystem Command Request	p.79
	18	14	S,H←E	Subsystem Command Acknowledge	p.79

List of Error Messages Refer to page 98.

Data Item Dictionary

SECS II data items	Name	Format	Value
ATTRID	Attribute ID	20	Attribute name
ATTRVAL	Attribute value	20	Attribute value
MID	Carrier ID	MID	20_{16} to $7E_{16}$ (Visible ASCII)
DATA	Data	20	All characters 00H-0FFH
DATALENGTH	DataSize	52	Offset designation: 1 to 224 Segment designation: Refer to ID Tag Memory Maps page 149.
DATASEG	DataSeg	20	Offset designation: "00", "01"..."0222", "0223" Segment designation: Refer to ID Tag Memory Maps page 149.
STATUS	PM information	20	"NE": Normally executed

Data Item Dictionary

SECS II data items	Name	Format	Value
SSACK	Result status	20	"NO": Normal "EE": Execution error *3 "CE": Communications error "HE": Hardware error *3 "TE": Tag error *3
List of STATUS	Status	L,4 1.<PMInformation> 2.<AlarmStatus> 3.<OperationalStatus> 4.<HeadStatus> *2	The STATUS values are included in the PM information.
CPVAL	State request	20	"OP", "MT", "PS" *1
TARGETID	Target ID	20	"00"-"31" "00" indicates the CIDRW Controller itself.
SSCMD	Subsystem commands	20	"ChangeState" "GetStatus" "PerformDiagnostics" "Reset"

*1: “PS” is an expansion command for this Unit.

*2: When the TARGET ID is "00" (CIDRW), this is a zero length item.

*3: "EE," "HE," and "TE" are used only with S18F6, S18F8, S18F10, and S18F12.

S9F7 Responses

An S9F7 response is given when a message in an illegal format is received from the host device.

"Illegal format" here means that there is a problem with the message composition, such as illegal attributes, or insufficient or too many items. If other problems relating to the item contents arise, the response is SSACK = "CE" (communications error).

Communications with the Host Device

Communicate with the host device only after confirming that the CIDRW Controller has started. Also, unstable signals may occur at the host interface when the CIDRW Controller is started. When initializing operation, clear the reception buffer at the host device or take other suitable methods to clear unwanted signals.

■ Specifications for Each Stream/Function

• Online Check

S1,F1	Are You There Request	S,H→E,reply
		Header only

S1,F2	On Line Data	S,H←E
L,2		
	1.<MDLN>	
	2.<SOFTREV>	
• Set MDLN (model number). • Set SOFTREV (software revision level).		

• Get Attributes

S18,F1	Read Attribute Request	S,H→E,reply
L,2		
	1.<TARGETID>	"00"-"31"
	2.L,n	
	1.<ATTRID1>	
	.	
	n.<ATTRIDn>	
• The setting for reading all attributes (CIDRW Controller or Heads) is n = 0.		

S18,F2	Read Attribute Data	S,H←E
L,4		
	1.<TARGETID>	"00"-"31"
	2.<SSACK>	
	3.L,n	
	1.<ATTRVAL1>	
	.	
	n.<ATTRVALn>	
	4.L,s	
	1.<STATUS1>	
	.	
	s.<STATUSs>	
• The order of the attribute data corresponds to the attribute ID specified by S18, F1. When reading of all attributes is specified, unsupported attribute items (ATTRVAL) are omitted. • When the specified target is invalid: n = 0, s = 0, SSACK = "CE" communications error • When one or more undefined attributes are included: n = 0, s = 0, SSACK = "CE" communications error • When Head attributes are specified with TARGET = “00” or CIDRW Controller attributes are specified with TARGET <> “00”: n = 0, s = 0, SSACK = “CE” communications error • If the status of SSACK is other than "NO" (normal), the List of Status will comprise zero items.		

• Set Attributes

F18,F3	Write Attribute Request	S,H→E,reply
L,2		
	1.<TARGETID>	"00" (fixed)
	2.L,n	
	1.L,2	
	1.<ATTRID1>	
	2.<ATTRVAL1>	
	n.L,2	
	1.<ATTRIDn>	
	2,<ATTRVALn>	
Since the attributes for Heads are all RO in this system, the target ID is fixed as “00”.		

S18,F4	Write Attribute Acknowledge	S,H←E
L,3		
	1.<TARGETID>	"00" (fixed)
	2.<SSACK>	
	3.L,s	
	1.<STATUS1>	
	.	
	s.<STATUSs>	

- When the specified target is invalid:
  s = 0, SSACK = "CE" communications error
- When one or more undefined attributes or RO attributes are included:
  s = 0, SSACK = "CE" communications error
- When illegal attribute data is specified:
  s = 0, SSACK = "CE" communications error
- If the status of SSACK is other than "NO" (normal), the List of Status will comprise zero items.

• Read Data

S18,F5	Read Request	S,H→E,reply
L,3		
	1.<TARGETID>	"01"-"31"
	2.<DATASEG>	
	3.<DATALENGTH>	
• When DATASEG is specified as "0" and a character string, the size of data determined by the DATALENGTH setting is read, starting from the address indicated by the DATASEG setting. If DATALENGTH = 0, data is read up to the end of the data area. • If DATASEG is specified as a character string, a size of data determined by DATALENGTH, starting from the address specified by DATASEG, is read (segment specification). • When the data of all segments is batch read, both DATASEG and DATALENGTH are omitted (they are zero length items). • When all the data for a particular segment is read, DATALENGTH is omitted (it is a zero length item). • In a segment specification, it is not possible to specify a DATALENGTH that exceeds the maximum length of the relevant DATASEG. • In a segment specification, if a DATALENGTH that is under the set length for DATASEG is specified, only the data corresponding to specified DATALENGTH is read.		

ID Tag Memory Maps Refer to page 149.

S18,F6	Read Data	S,H→E,reply
L,4		
	1.<TARGETID>	"01"-"31"
	2.<SSACK>	
	3.<DATA>	
	4.L,s	
	1.<STATUS1>	
	.	
	s.<STATUSs>	
• When the specified target is invalid: DATA item length = 0, s = 0, SSACK = "CE" communications error • In an address specification, if: (SEGMENT + DATALENGTH) ≤ total value for all segments then SSACK = "NO" • In an address specification, if: (SEGMENT + DATALENGTH) > total value for all segments then DATA item length = 0, s = 0, SSACK = "CE" communications error • In a segment specification, if an undefined DATASEG is specified, or if the DATALENGTH is illegal: DATA item length = 0, s = 0, SSACK = "CE" communications error • When reading of all segment data is specified in a system where the data segment is not defined: DATA length = 0, SSACK = "NO" • If the status of SSACK is other than "NO" (normal), the List of Status will comprise zero items.		

• Write Data

S18,F7	Write Request	S,H→E,reply
L,4		
	1.<TARGETID>	"01"-"31"
	2.<DATASEG>	
	3.<DATALENGTH>	
	4.<DATA>	

- If DATASEG is specified as "0" and a character string, a size of data corresponding to the DATALENGTH setting and starting from the address within the data area indicated by the DATASEG setting is written (address specification). If DATALENGTH = 0, data is written up to the end of the data area.
- If DATASEG is specified as a character string, a size of data determined by DATALENGTH, starting from the address specified by DATASEG, is written (segment specification).
- When the data for all segments is batch written, both DATASEG and DATALENGTH are omitted (they are zero length items).
- When all the data for a particular segment is written, DATALENGTH is omitted (it is a zero length item).
- In a segment specification, it is not possible to specify a DATALENGTH that exceeds the maximum length of the relevant DATASEG.
- In a segment specification, if a DATALENGTH that is under the set length for DATASEG is specified, only the data corresponding to the specified DATALENGTH is written, compressed into the smaller addresses.
- The item lengths of DATASEG and DATA must be matched.
- If DATASEG and DATALENGTH are both omitted (made zero length items), the length of DATA must match the total of the set lengths of all segments.

ID Tag Memory Maps Refer to page 149.

S18,F8	Write Acknowledge	S,H←E
L,3		
	1.<TARGETID>	"01"-"31"
	2.<SSACK>	
	3.L,s	
	1.<STATUS1>	
	.	
	s.<STATUSs>	

- When the specified target is invalid:
  s = 0, SSACK = "CE" communications error
- In an address specification, if:
  (SEGMENT + DATALENGTH) ≤ total value for all segments then SSACK = "NO"
- In an address specification, if:
  (SEGMENT + DATALENGTH) > total value for all segments then DATA item length = 0, s = 0, SSACK = "CE" (communications error)
- In a segment specification, if DATASEG and DATALENGTH are illegal:
  s = 0, SSACK = "CE" communications error
- If the status of SSACK is other than "NO" (normal), the List of Status will comprise zero items.

• Read ID

S18,F9	Read ID Request	S,H→E,reply
1.<TARGETID>		"01"-"31"

ID Tag Memory Maps Refer to page 149.

S18,F10	Read ID Data	S,H←E
L,4		
	1.<TARGETID>	"01"-"31"
	2.<SSACK>	
	3.<MID>	
	4.L,s	
	1.<STATUS1>	
	.	
	s.<STATUSs>	

- If the MID data contains Non-Visible ASCII code:
  s = 0, MID item length = 0, SSACK = "EE" execution error
- When the specified target is invalid:
  s = 0, MID item length = 0, SSACK = "CE" communications error
- If the status of SSACK is other than "NO" (normal), the List of Status will comprise zero items.

• Write ID

S18,F11	Write ID Request	S,H→E,reply
L,2		
	1.<TARGETID>	"01"-"31"
	2.<MID>	

- If an MID that is under the length set for the CarrierIDlength attribute is specified, an error occurs and the MID data is not written.

ID Tag Memory Maps Refer to page 149.

S18,F12	Write ID Acknowledge	S,H←E
L,3		
	1.<TARGETID>	"01"-"31"
	2.<SSACK>	
	3.L,s	
	1.<STATUS1>	
	.	
	s.<STATUSs>	

- When the specified target is invalid:
  s = 0, SSACK = "CE" communications error
- When there is an MID length error:
  s = 0, SSACK = "CE" communications error
- If the MID data contains Non-Visible ASCII code:
  s = 0, SSACK = "EE" execution error
- If the status of SSACK is other than "NO" (normal), the List of Status will comprise zero items.

• Subsystem Command (ChangeState)

S18,F13	Subsystem Command Request (ChangeState)	S,H→E,reply
L,3		
	1.<TARGETID>	"00" (fixed)
	2.<SSCMD>	"ChangeState"
	3.L,1	
	1.<CPVAL1>	"OP", "MT" or "PS"
CPVAL = "PS" is a parameter setting unique to this CIDRW Controller for switching to the Setting mode.		

S18,F14	Subsystem Command Acknowledge (ChangeState)	S,H←E
L,3		
	1.<TARGETID>	"00"
	2.<SSACK>	
	3.L,s	
	1.<STATUS1>	
	.	
	s.<STATUSs>	

- When the specified target is invalid:
  s = 0, SSACK = "CE" communications error
- When SSCMD is invalid:
  s = 0, SSACK = "CE" communications error
- When OperationalStatus is BUSY:
  s = 0, SSACK = “EE” execution error
- If the status of SSACK is other than "NO" (normal), the List of Status will comprise zero items.

• Subsystem Command (GetStatus)

S18,F13	Subsystem Command Request (GetStatus)	S,H→E,reply
L,3		
	1.<TARGETID>	"00"-"31"
	2.<SSCMD>	"GetStatus"
	3.L,0	

S18,F14	Subsystem Command Acknowledge (GetStatus)	S,H←E
L,3		
	1.<TARGETID>	"00"-"31"
	2.<SSACK>	"GetStatus"
	3.L,s	
	1.<STATUS1>	
	.	
	s.<STATUSs>	

- When the specified target is invalid:
  s = 0, SSACK = “CE” communications error
- When SSCMD is invalid:
  s = 0, SSACK = “CE” communications error
- If the status of SSACK is other than "NO" (normal), the List of Status will comprise zero items.

• Subsystem Command (PerformDiagnostics)

S18,F13	Subsystem Command Request (PerformDiagnostics)	S,H→E,reply
L,3		
	1.<TARGETID>	"00"-"31"
	2.<SSCMD>	"PerformDiagnostics"
	3.L,0	

S18,F14	Subsystem command Acknowledge (PerformDiagnostics)	S,H←E
L,3		
	1.<TARGETID>	"00"-"31"
	2.<SSACK>	
	3.L,s	
	1.<STATUS1>	
	.	
	s.<STATUSs>	

- When the specified target is invalid:
  s = 0, SSACK = “CE” communications error
- When SSCMD is invalid:
  s = 0, SSACK = “CE” communications error
- If the status of SSACK is other than "NO" (normal), the List of Status will comprise zero items.

• Subsystem Command (Reset)

S18,F13	Subsystem Command Request (Reset)	S,H→E,reply
L,3		
	1.<TARGETID>	"00" (fixed)
	2.<SSCMD>	"Reset"
	3.L,0	

S18,F14	Subsystem Command Acknowledge (Reset)	S,H←E
L,3		
	1.<TARGETID>	"00"
	2.<SSACK>	
	3.L,0	
• When the specified target is invalid: SSACK = “CE” communications error • When SSCMD is invalid: SSACK = “CE” communications error		

■ Operation Conditions

The response messages and response codes (SSACK) in each state are shown below.

State		Initializing	Operating		Maintenance
Message	Function		IDLE	BUSY	
S1,F1	OnlineRequest	S1,F0	S1,F2	S1,F2	S1,F2
S18,F11	WriteID	S18,F0	S18,F0	S18,F0	NO
S18,F7	WriteData	S18,F0	NO	NO	S18,F0
S18,F3	SetAttribute	S18,F0	NO	NO	NO
S18,F13(Reset)	Reset	S18,F0	NO	NO	NO
S18,F9	ReadID	S18,F0	NO	NO	NO
S18,F5	ReadData	S18,F0	NO	NO	S18,F0
S18,F13(PerformDiagnostics)	Diagnostics	S18,F0	NO	NO	NO
S18,F13(GetStatus)	GetStatus	S18,F0	NO	NO	NO
S18,F1	GetAttribute	S18,F0	NO	NO	NO
S18,F13(ChangeState)	ChangeState(to MT)	S18,F0	NO	S18,F0	S18,F0
S18,F13(ChangeState)	ChangeState(to OP)	S18,F0	S18,F0	S18,F0	NO
S18,F13(ChangeState)	ChangeState(to PS)	S18,F0	NO	S18,F0	NO

When SECS Is Not Used

Command/Response Format

■ 1:N Protocol

Command

SOH	Node No.		Command code				Parameter						FCS		CR
							1		· · ·		n				
01h															0Dh

Response

SOH	Node No.		Response code		Parameter						FCS		CR
					1		· · ·		n				
01h													0Dh

■ 1:1 Protocol

Command

Command code				Parameter						CR
				1		· · ·		n		
										0Dh

Response

Response code		Parameter						CR
		1		· · ·		n		
								0Dh

Meaning of FCS (frame check sequence)
This is two ASCII code characters obtained by conversion from the 8-bit exclusive logical sum (EOR) of the characters from the character immediately after SOH to the character immediately before FCS.

Example: Reading the data of page 1 and page 2 of node No.1

Command [SOH]01010000000000C[FCS][CR]
└──────────┘
Calculation range

```
'0' (30h) =  0011 0000 )EOR
'1' (31h) =  0011 0001 )EOR
'0' (30h) =  0011 0000 )EOR
'1' (31h) =  0011 0001 )EOR
'0' (30h) =  0011 0000 )EOR
'0' (30h) =  0011 0000 )EOR
'0' (30h) =  0011 0000 )EOR
'0' (30h) =  0011 0000 )EOR
'0' (30h) =  0011 0000 )EOR
'0' (30h) =  0011 0000 )EOR
'0' (30h) =  0011 0000 )EOR
'0' (30h) =  0011 0000 )EOR
'C' (43h) =  0100 0011
             0111 0011
               ↓    ↓
               7    3
(ASCII conversion)↓
          '7' (37h)  '3' (33h)
```

Command

Command Code List

Name	Value	Function	See
READ	0100	When this command is received, the system communicates with the ID Tag, and reads the specified page(s) of data. Any pages up to a maximum of 16 can be selected.	p.86
WRITE	0200	When this command is received, the system communicates with the ID Tag, and writes the specified page(s) of data. Any pages up to a maximum of 16 can be selected.	p.87
SAME WRITE	0300	When this command is received, the system communicates with the ID Tag, and writes the same data in page units to the specified pages. Up to 17 pages, which is the maximum number of pages for an ID Tag, can be specified.	p.89
BYTE WRITE	0400	When this command is received the system communicates with the ID Tag, and writes data to the area specified by a first address and number of bytes. A maximum of 128 bytes can be specified.	p.90
TEST	10	Sends received data to the host device.	p.91
NAK	12	Sends the response made immediately before again.	p.92
GET PARAMETER	14	Gets the model number, Firmware version, or another parameter.	p.92
GET LAST COMMAND	15	Gets the command code of the last command that was executed.	p.94
GET COMMUNICATIONS HISTORY	16	Gets the history of communications from when the power was turned ON (total number of communications, total successful communications, and total number of failed communications).	p.95
CLEAR COMMUNICATIONS HISTORY	17	Clears the communications history.	p.96
NOISE MEASUREMENT	40	Measures the noise in the vicinity of the CIDRW Head.	p.96
RESET	7F	Resets the Amplifier Unit.	p.96

Response Code List

Type	Response code	Name	Description
Normal end	00	Normal end	Command execution is completed normally.
Host communications error	14	Format error	There is a mistake in the command format. (For example, the command code is undefined, or the page or address specification is inappropriate.)
Communications error	70	Communications error	Noise or another hindrance occurs during communications with an ID Tag, and communications cannot be completed normally.
	71	Verification error	Correct data cannot be written to an ID Tag.
	72	No Tag error	Either there is no ID Tag in front of the CIDRW Head, or the CIDRW Head is unable to detect the ID Tag due to environmental factors (e.g., noise).
	7B	Outside write area error	A write operation was not completed normally because the ID Tag was in an area in which the ID Tag could be read but not written.
	7E	ID system error (1)	The ID Tag is in a status where it cannot execute command processing.
	7F	ID system error (2)	An inapplicable ID Tag has been used.

CHECK!

Communications with the Host Device

Communicate with the host device only after confirming that the CIDRW Controller has started. Also, unstable signals may occur at the host interface when the CIDRW Controller is started. When initializing operation, clear the reception buffer at the host device or take other suitable methods to clear unwanted signals.

The command and response details are given for a 1:N protocol. Just as in the previous command format, the details for a 1:1 protocol are the same if the SOH, node number, and FCS are deleted.

■ READ

Reads any pages of data from the ID Tag. The maximum number of pages that can be read at one time is 16.

Command

SOH	Node No.		Command code				Page designation (8 characters)								FCS		CR
01h			0	1	0	0											0Dh

Bit	7	-	0	7	-	3	2	1	0	7	6	-	1	0	7	6	-	2	1	0
Page	Sys	-	Sys	Sys	-	Sys	17	16	15	14	13	-	8	7	6	5	-	1	Sys	Sys
Designation	0*	0*		0*	0*	0*	0/1	0/1	0/1	0/1	0/1	•••	0/1	0/1	0/1	0/1	•••	0/1	0*	0*
Value	00		00 to 07							00 to FF					00 to FC					

* Always specify 0. If you specify 1 an error (Response code: 14) will occur.

Parameter Description

Parameter	Description
Page designation	Pages are specified by setting the bits corresponding to pages that are to be read to 1 and setting the other bits to 0, then converting the result to a hexadecimal character string.

ID Tag Memory Maps Refer to page 149.

The response code (when normal: 00) and the data in the specified pages are returned in ascending order of page numbers.

Response

SOH	Node No.		Response code		Read data														FCS		CR
					Page n						. . .		Page m (n<m)								
					Data 1		. . .		Data 8				Data 1		. . .		Data 8				
01h			0	0																	0Dh

Example: Reading the data of pages 1 and 3 of node No.1

Data Content of the ID Tag

Page 1	12h	34h	56h	78h	90h	12h	34h	56h
Page 2								
Page 3	11h	22h	33h	44h	55h	66h	77h	88h
Page 4								

Command

SOH	Node No.		Command code				Page designation								FCS		CR
01h	0	1	0	1	0	0	0	0	0	0	0	0	1	4	0	5	0Dh

Binary notation

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0

Response

SOH	Node No.		Response code		Page 1															Page 3																FCS		CR
01h	0	1	0	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	0	7	0Dh

CHECK!

If you send a “Read“ command that specified 1 to 2 page to a 1-page only ID Tag, the Amplifier Unit will response 2nd page data as all zero.

■ WRITE

Data is written in page units to the ID Tag. Any page(s) can be specified. It is possible to write to a maximum of 16 pages at one time.

Command

SOH	Node No.		Command code				Page designation (8 characters)								Write data																FCS		CR
															Page n						. . .		Page m (n<m)										
															Data 1			· · ·		Data 8			Data 1			· · ·		Data 8					
01h			0	2	0	0																											0DH

Bit	7	-	0	7	-	3	2	1	0	7	6	-	1	0	7	6	-	2	1	0
Page	Sys	-	Sys	Sys	-	Sys	17	16	15	14	13	-	8	7	6	5	-	1	Sys	Sys
Designation	0*	0*		0*	0*	0*	0/1	0/1	0/1	0/1	0/1	•••	0/1	0/1	0/1	0/1	•••	0/1	0*	0*
Value	00			00 to 07						00 to FF					00 to FC					

* Always specify 0. If you specify 1 an error (Response code: 14) will occur.

Parameter Description

Parameter	Description
Page designation	Pages are specified by setting the bits corresponding to pages that are to be read to 1 and setting the other bits to 0, then converting the result to a hexadecimal character string.
Write data	The data to be written to the specified pages is specified in ascending order of page numbers.

ID Tag Memory Maps Refer to page 149.

Response

The response code (when normal: 00) is returned.

SOH	Node No.		Response code		FCS		CR
01h			0	0			0Dh

Example: Writing data to pages 8 and 10 of node No.1

Command

SOH	Node No.		Command code				Page designation								Data of page 8																Data of page 10														FCS		CR
01h	0	1	0	2	0	0	0	0	0	0	0	A	0	0	1	1	2	2	3	3	4	4	5	5	6	6	7	7	8	8	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F	7	4	0Dh

Binary notation

0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Response

SOH	Node No.		Response code		FCS		CR
01h	0	1	0	0	0	1	0Dh

The ID Tag status on normal completion is as shown below.

Page 8	11h	22h	33h	44h	55h	66h	77h	88h
Page 9								
Page 10	01h	23h	45h	67h	89h	ABh	CDh	EFh

■ SAME WRITE

This command writes the same data to multiple pages of an ID Tag. Any page(s) can be specified.

Command

SOH	Node No.		Command code				Page designation (8 characters)								Write data								FCS		CR
															Data 1			· · ·			Data 8				
01h			0	3	0	0																			0DH

Bit	7	-	0	7	-	3	2	1	0	7	6	-	1	0	7	6	-	2	1	0
Page	Sys	-	Sys	Sys	-	Sys	17	16	15	14	13	-	8	7	6	5	-	1	Sys	Sys
Designation	0*	0*		0*	0*	0*	0/1	0/1	0/1	0/1	0/1	•••	0/1	0/1	0/1	0/1	•••	0/1	0*	0*
Value	00			00 to 07						00 to FF					00 to FC					

* Always specify 0. If you specify 1 an error (Response code: 14) will occur.

Parameter Description

Parameter	Description
Page designation	Pages are specified by setting the bits corresponding to pages that are to be read to 1 and setting the other bits to 0, then converting the result to a hexadecimal character string.
Write data	Specify the write data.

ID Tag Memory Maps Refer to page 149.

Response

The response code (when normal: 00) is returned.

SOH	Node No.		Response code		FCS		CR
01h			0	0			0Dh

Example: Clearing pages 1 to 17 of node No.1 to 0

Command

SOH	Node No.		Command code				Page designation								Write data																		FCS		CR
01h	0	1	0	3	0	0	0	0	0	7	F	F	F	C	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0Dh

Binary notation

0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0

Response

SOH	Node No.		Response code		FCS		CR
01h	0	1	0	0	0	1	0Dh

■ BYTE WRITE

This command writes data to any specified number of bytes starting from the address specified in the ID Tag. The maximum number of bytes that can be written at one time is 128.

Command

SOH	Node No.		Command code				First address		Write data						FCS		CR
									Data 1		•••		Data n				
01h			0	4	0	0											0Dh

* Data number n = number of bytes written to (2-character units)

Parameter Description

Parameter	Description
First address	Addresses can be specified in the range 00h to 87h.
Write data	Up to 128 bytes of write data, starting from the specified address, can be specified.

ID Tag Memory Maps Refer to page 149.

Response

The response code (when normal: 00) is returned.

SOH	Node No.		Response code		FCS		CR
01h			0	0			0Dh

Example: Writing to two bytes starting from address 05h of node No.1

Command

SOH	Node No.		Command code				First address		Write data				FCS		CR
									Data 1		Data 2				
01h	0	1	0	4	0	0	0	5	1	2	3	4	0	4	0Dh

Response

SOH	Node No.		Response code		FCS		CR
01h	0	1	0	0	0	1	0Dh

The ID Tag status on normal completion is as shown below.

Page 1						12h	34h	
Page 2								

■ TEST

Performs a communications test on communications between the host device and Amplifier Unit. When an Amplifier Unit receives a test command, it sends the response code and command test data to the host device as the response.

Command

SOH	Node No.		Command code		Test data						FCS		CR
					Data 1		•••		Data n				
01h			1	0									0Dh

* Number of data n < 136 (2-character units)

Parameter Description

Parameter	Description
Test data	The data to be sent in the test is specified with a hexadecimal value. (270 characters max.) However, note that odd numbers of characters cannot be used.

Response

The response code (when normal: 00) and the received test data are returned.

SOH	Node No.		Response code		Test data						FCS		CR
					Data 1		•••		Data n				
01h			0	0									0Dh

Example: Testing by sending the data 12345678 to node No.1

Command

SOH	Node No.		Command code		Test data								FCS		CR
					Data 1		Data 2		Data 3		Data 4				
01h	0	1	1	0	1	2	3	4	5	6	7	8	0	8	0Dh

Response

SOH	Node No.		Response code		Test data								FCS		CR
					Data 1		Data 2		Data 3		Data 4				
01h	0	1	0	0	1	2	3	4	5	6	7	8	0	9	0Dh

■ NAK

Sends the response made immediately before again.

Command

SOH	Node No.		Command code		FCS		CR
01h			1	2			0Dh

Response

Sends the response made immediately before again.

■ GET PARAMETER

This command gets the model number, firmware version, or another parameter.

Command

SOH	Node No.		Command code		Parameter type		FCS		CR
01h			1	4					0Dh

Parameter Description

Parameter	Value	**Description**
Parameter type	01	Model number
	02	Firmware version
	20	Memory status
	21	Antenna connection status

Response

The response code (00: normal) and received parameter value are returned.

SOH	Node No.		Response code		Parameter value						FCS		CR
01h			0	0									0Dh

* The contents and length of the parameter value depend on the parameter type that is specified for the command.

Example 1: Getting the Model Number of Node 1

Command

SOH	Node No.		Command code		Parameter type		FCS		CR
01h	0	1	1	4	0	1	0	5	0Dh

Response

The product model number is returned as an ASCII text string.

SOH	Node No.		Response code		Model number													FCS		CR
01h	0	1	0	0	V	6	4	0	-	H	A	M	1	1	-	V	3	4	4	0Dh

Example 2: Getting the Firmware Version of Node 1

Command

SOH	Node No.		Command code		Parameter type		FCS		CR
01h	0	1	1	4	0	2	0	6	0Dh

Response

The response code (00: normal) and firmware version are returned as a 4-digit decimal number.

SOH	Node No.		Response code		Firmware version				FCS		CR
01h	0	1	0	0	0	1	0	0	0	0	0Dh

Major version Minor version

* The above response is for a firmware version of 1.00.

Example 3: Getting the Memory Status of Node 1

Command

SOH	Node No.		Command code		Parameter type		FCS		CR
01h	0	1	1	4	2	0	0	6	0Dh

Response

The response code (00: normal) and memory check results for internal EEPROM are returned.

SOH	Node No.		Response code		Memory status		FCS		CR
01h	0	1	0	0			0	0	0Dh

* “Memory status” will be if the memory is normal:”01”, and is error:”00”.

Example 4: Getting the Antenna Connection Status of Node 1

Command

SOH	Node No.		Command code		Parameter type		FCS		CR
01h	0	1	1	4	2	1	0	7	0Dh

Response

The response code (00: normal) and Antenna connection status are returned.

SOH	Node No.		Response code		Antenna connection status		FCS		CR
01h	0	1	0	0			0	0	0Dh

* “Antenna connectionstatus” will be if the antenna is connected correctly:”01”, and is not correctly:”00”.

■ GET LAST COMMAND

Gets the command code of the last command that was executed.

Command

SOH	Node No.		Command code		FCS		CR
01h			1	5			0Dh

Response

This command returns the command code of the last command that was executed.

When There Is a Previously Executed Command

SOH	Node No.		Response code		Command code				FCS		CR
01h			0	0							0Dh

* The command code is given as two or four characters.

When There Is No Previously Executed Command

SOH	Node No.		Response code		Command code		FCS		CR
01h			0	0	0	0			0Dh

■ GET COMMUNICATIONS HISTORY

This command gets the history of communications from when the power was turned ON (total number of communications, total successful communications, and total number of failed communications).

Command

SOH	Node No.		Command code		FCS		CR
01h			1	6			0Dh

Response

This command returns the history of communications from when the power was turned ON. Four hexadecimal digits each are returned for the total number of communications, total number of successful communications, and total number of failed communications.

If the total number of communications exceeds 65,535, all data in the communications history will be reset to 0.

SOH	Node No.		Response code		Total number of communications				Total number of successful communications				Total number of failed communications				FCS		CR
01h			0	0															0Dh

Example: Getting the Communications History of Node 1

Command

SOH	Node No.		Command code		FCS		CR
01h	0	1	1	6	0	6	0Dh

Response

The following response is returned if there are 32,000 total communications, 30,000 successful communications, and 2,000 failed communications.

SOH	Node No.		Response code		Total number of communications				Total number of successful communications				Total number of failed communications				FCS		CR
01h	0	1	0	0	7	D	0	0	7	5	3	0	0	7	D	0	0	0	0Dh

■ CLEAR COMMUNICATIONS HISTORY

This command clears the communications history.

Command

SOH	Node No.		Command code		FCS		CR
01h			1	7			0Dh

Response

SOH	Node No.		Response code		FCS		CR
01h			0	0			0Dh

■ NOISE MEASUREMENT

The levels of noise in the vicinity of the CIDRW Head are measured and the noise level is expressed numerically in the range "00" to "99."

Command

SOH	Node No.		Command code		FCS		CR
01h			4	0			0Dh

Response

The response code (when normal: 00) and the noise level "00" to "99" are returned.

SOH	Node No.		Response code		Noise level		FCS		CR
01h			0	0					0Dh

Influence of background noise on communications distance Refer to page 148.

■ RESET

All Amplifier Unit processing is stopped, and the initial status is re-established.

Command

SOH	Node No.		Command code		FCS		CR
01h			7	F			0Dh

Response

There is no response to this command.

SECTION 5
Troubleshooting

When SECS Is Used	98
When SECS Is Not Used	104

When SECS Is Used

Errors are indicated by the contents of the CIDRW Controller response messages, and by the indicators.

List of Error Messages

When responses are made to messages sent by the CIDRW Controller, errors are expressed by the contents of error messages and the nature of the SSACK response.

S	F	Direction	SECS II names
1	0	S,H←E	Abort Transaction
9	0	S,H→E	Abort Transaction
9	1	S,H←E	Unrecognized Device ID
9	3	S,H←E	Unrecognized Stream Type
9	5	S,H←E	Unrecognized Function Type
9	7	S,H←E	Illegal Data
9	9	S,H←E	Transaction Timer Timeout
9	11	S,H←E	Data Too Long
18	0	S,H←E	Abort Transaction

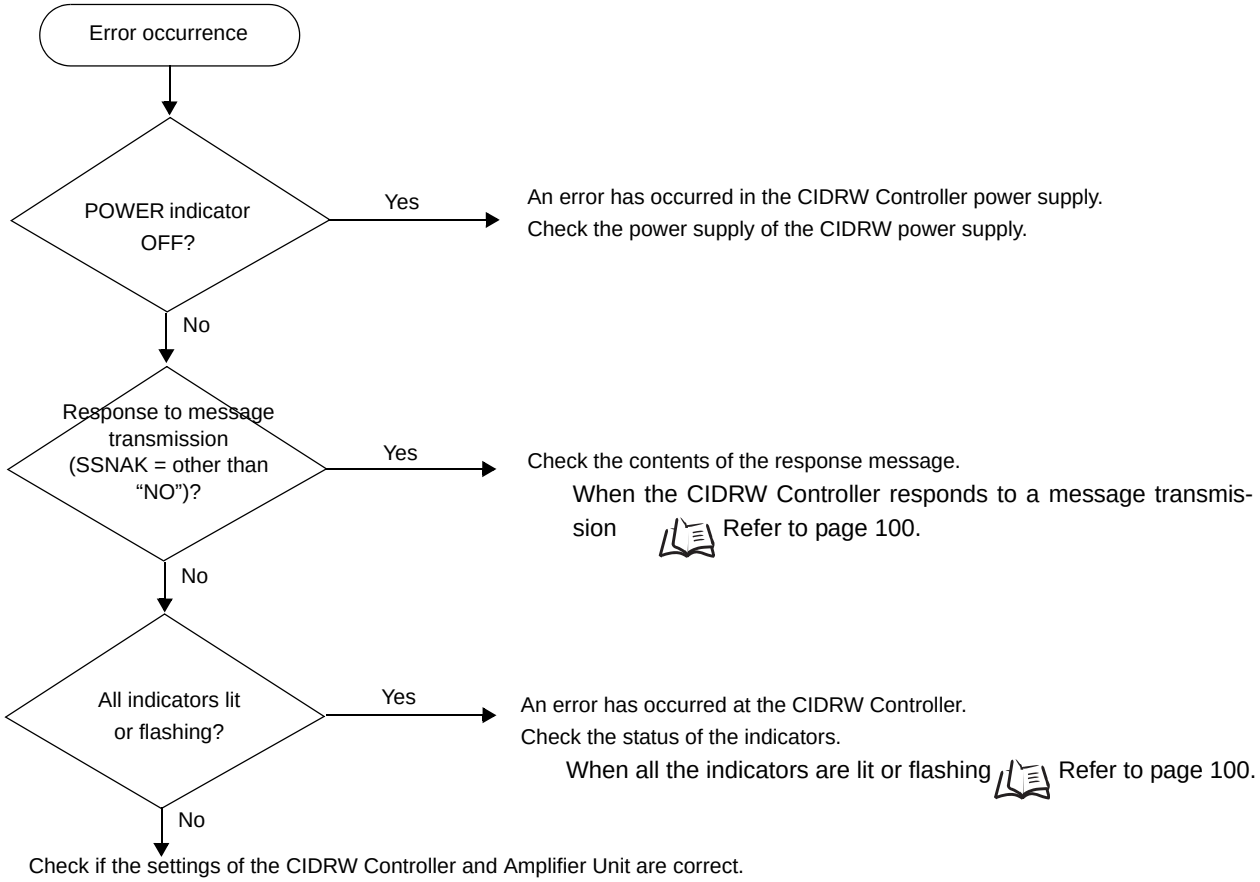
Controller Indicators

If an error or alarm has occurred at the CIDRW Controller, the indicators on the front of the Controller light.

Name	Function
OPERATING (green)	Lit when the operation status (status model) of the CIDRW system is operating.
ALARMS (green)	Lit when the status in AlarmStatus of the CIDRW system is Alarm (1).
BUSY (green)	Lit when the status in OperationalStatus of the CIDRW system is BUSY.
ERROR (red)	When a processing error is detected (when SSACK is other than NO), this indicator is lit for 50 ms.

Operation Check Flowchart

■ Normal Operation Mode


Error occurrence
POWER indicator OFF?
Yes
An error has occurred in the CIDRW Controller power supply.
Check the power supply of the CIDRW power supply.
No
Response to message transmission (SSNAK = other than "NO")?
Yes
Check the contents of the response message.
When the CIDRW Controller responds to a message transmission
Refer to page 100.
No
All indicators lit or flashing?
Yes
An error has occurred at the CIDRW Controller.
Check the status of the indicators.
When all the indicators are lit or flashing
Refer to page 100.
No
Check if the settings of the CIDRW Controller and Amplifier Unit are correct.

When the CIDRW Controller Fails to Respond To Messages Sent to It Refer to page 101.

When an Error Unrelated to Message Transmission and Responses Occurs Refer to page 101.

• Operating Normally in the Normal Operation Mode

Indicators

POWER	OPERATING	ALARMS	BUSY	ERROR
☼	☼	●	●	●

Response

Response		Function
S	F	
—	—	SSACK="NO"

• When the CIDRW Controller Responds to a Message Transmission

There is a mistake in the message sent to the CIDRW Controller or the Amplifier Unit settings. After taking the appropriate corrective action, restart the Controller and the Amplifier Unit and send the message again.

Response		Main check points	
S	F		
—	0	Status conditions when the message was issued (e.g., a **Write ID Request** message (S18, F11) was sent in the operating mode, or the message was sent during initial processing) Operation Conditions Refer to page 82.	
9	7	Message composition: illegal attributes, insufficient items, etc.	
Other than above		Ascertain the cause from the contents of the SSACK response.	
		CE	• Mistake in the details of the items in the message (The node number of an amplifier that is not set was specified as the TARGET ID, or a segment name that is not set has been specified for DATASEG.) • Connection of RS-485 cables between Amplifier Units (failure to detect Amplifier Units) • Amplifier Unit baud rate settings (failure to detect Amplifier Units) • Node numbers of the Amplifier Units (The same number is set for more than one Unit, making detection impossible) • Cable routing between the host device and CIDRW Controller (influence of background noise) • Noise levels of the power supply line to the CIDRW Controller
		EE	• Installation distance/inclination between the ID Tag and CIDRW Head • Background noise levels of the CIDRW Head • Installation spacing in relation to CIDRW Heads connected in other CIDRW systems • When the ID read command is executed, the carrier ID contains non-visible ASCII code.
		HE	• Mistake in the details of the items in the message (A segment that does not match the Amplifier Unit specifications has been set; the response time-out setting is not correct.) • Connection and wiring of cable between CIDRW Controller and Amplifier Unit • Power supply to Amplifier Units • Amplifier Unit terminal resistance settings • Routing of each cable (influence of background noise) • Node numbers of the Amplifier Units (the same number is set for more than one Unit) • Amplifier Unit error (hardware error) • Noise levels of the power supply line
		TE	• Type/specifications of the ID Tags used • Settings of the ID Tags used (lock, etc.) • Environment of use of the ID Tags (ID Tag breakage due to use in unanticipated ways) • ID Tag overwrite life

• When All the Indicators are Lit or Flashing

An error has occurred in the CIDRW Controller.

After taking the appropriate corrective action, restart the CIDRW Controller.

POWER	OPERATING	ALARMS	BUSY	ERROR	Main check points
●	●	●	●	●	• Supply of 24 VDC power
☼	☼	☼	☼	☼	• The CIDRW Controller may be damaged.
☼	◐	◐	◐	◐	• Mode switch setting (Is the setting 0?) If the error cannot be resolved after checking, the CIDRW Controller may be damaged.
☼	☼	◐	◐	◐	• The CIDRW Controller may be damaged.

• When the CIDRW Controller Fails to Respond To Messages Sent to It

There is a mistake in the CIDRW Controller or Amplifier Unit settings.

After taking the appropriate corrective action, restart the CIDRW Controller and Amplifier Unit.

POWER	OPERATING	ALARMS	BUSY	ERROR	Main check points
	●	●	●	●	• Mode switch setting (Is the setting 0?) • Cable wiring between the CIDRW Controller and host device
	●	●	●		
				●	
		●	●	●	• Communications conditions for communications between the CIDRW Controller and host device (baud rate, character composition, etc.) • Cable wiring between the CIDRW Controller and host device
	●	●		●	• Node numbers of the Amplifier Units (The same number is set for more than one Unit.)

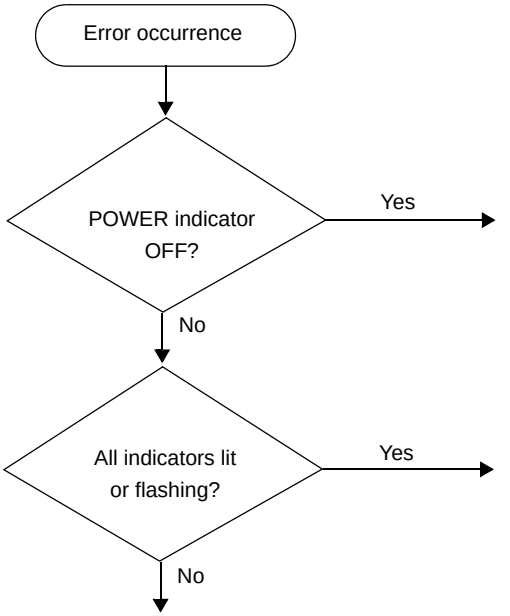
• When an Error Unrelated to Message Transmission and Responses Occurs

There is a mistake in the settings of the CIDRW Controller and Amplifier Unit.

After taking the appropriate corrective action, restart the CIDRW Controller and Amplifier Unit.

POWER	OPERATING	ALARMS	BUSY	ERROR	Main check points
			●	●	• Mode switch setting (Is the setting 0?) • Amplifier Unit baud rate settings • Node numbers of the Amplifier Units (The same number is set for more than one Unit.) • Connection and wiring of cable between CIDRW Controller and Amplifier Unit • Amplifier Unit error (hardware error) • Routing of each cable (influence of background noise)

■ Setting Mode


Error occurrence
POWER indicator OFF?
Yes
An error has occurred in the CIDRW Controller power supply.
Check the power supply of the CIDRW Controller.
No
All indicators lit or flashing?
Yes
An error has occurred at the CIDRW Controller.
Check the status of the indicators.
When all the indicators are lit or flashing Refer to page 103.
No
Check if the CIDRW Controller settings are correct.

When the CIDRW Controller fails to respond to messages sent to it Refer to page 103.

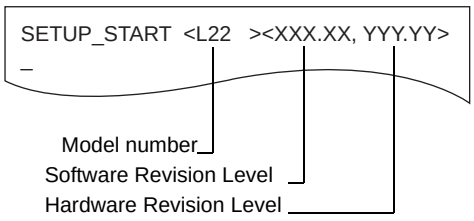
When an Error Unrelated to Message Transmission and Responses Occurs Refer to page 103.

• Operating Normally in the Setting mode

Indicators

POWER	OPERATING	ALARMS	BUSY	ERROR
☼	◐	☼	☼	●

Terminal Initial Display of the Host Device after Startup in the Setting mode



Terminal Display When Parameter Setting Has Been Completed without Error

• When All the Indicators Are Lit or Flashing

An error has occurred in the CIDRW Controller.

After taking appropriate corrective action, restart the CIDRW Controller and check the indicators.

POWER	OPERATING	ALARMS	BUSY	ERROR	Main check points
●	●	●	●	●	• Supply of 24 VDC power
☼	☼	☼	☼	☼	• The CIDRW Controller may be damaged.
☼	◐	◐	◐	◐	• Mode switch setting (Is the setting 3?) If the error cannot be resolved after checking, the CIDRW Controller may be damaged.
☼	☼	◐	◐	◐	• The CIDRW Controller may be damaged.

• When the CIDRW Controller Responds to a Message Transmission

There is a mistake in the CIDRW Controller settings or the sent parameters.

After taking appropriate corrective action, restart the CIDRW Controller and check the indicators.

POWER	OPERATING	ALARMS	BUSY	ERROR	Main check points
☼	◐	☼	☼	☼	• Sent parameters (Are the parameters correct? Are the settings correct?)

Response	Contents
SETUP_FAILED [□]	The parameters are not updated. The figure in square brackets [ ] indicates the line number where the error was first detected. If a parity error is detected in the received characters, this figure is [0].

• When the CIDRW Controller Fails to Respond To Messages Sent to It

There is a mistake in the CIDRW Controller settings or the sent parameters.

After taking appropriate corrective action, restart the CIDRW Controller and check the indicators.

POWER	OPERATING	ALARMS	BUSY	ERROR	Main check points
☼	◐	◐	☼	●	• Transmission parameters (Are the parameters correct?) • Communications conditions for communications between the CIDRW Controller and the host device (baud rate, character composition, etc.)
☼	☼	●	●	●	• Mode switch setting (Is the setting 3?)

• When an Error Unrelated to Message Transmission and Responses Occurs

There is a mistake in the settings of the CIDRW Controller or Amplifier Unit.

After taking appropriate corrective action, restart the CIDRW Controller and Amplifier Unit and check the indicators.

POWER	OPERATING	ALARMS	BUSY	ERROR	Main check points
☼	☼	☼	●	●	• Mode switch setting (Is the setting 3?)

When SECS Is Not Used

Errors are indicated by the presence or absence of a response to an Amplifier Unit command, and by the indicators.

List of Error Messages

Type	Response code	Name	Description
Host communications error	14	Format error	There is a mistake in the command format. (For example, the command portion is undefined, or the page or address specification is inappropriate.)
Communications error between the CIDRW Head and ID Tag	70	Communications error	Noise or another hindrance has occurred during communications with an ID Tag, and communications cannot be completed normally.
	71	Verification error	Correct data cannot be written to an ID Tag.
	72	No Tag error	Either there is no ID Tag in front of the CIDRW Head, or the CIDRW Head is unable to detect the ID Tag due to environmental factors (e.g., noise).
	7B	Outside write area error	The ID Tag is at a position where reading is possible but writing is not, so writing does not complete normally.
	7E	ID system error (1)	The ID Tag is in a status where it cannot execute the command processing.
	7F	ID system error (2)	An inapplicable ID Tag has been used.

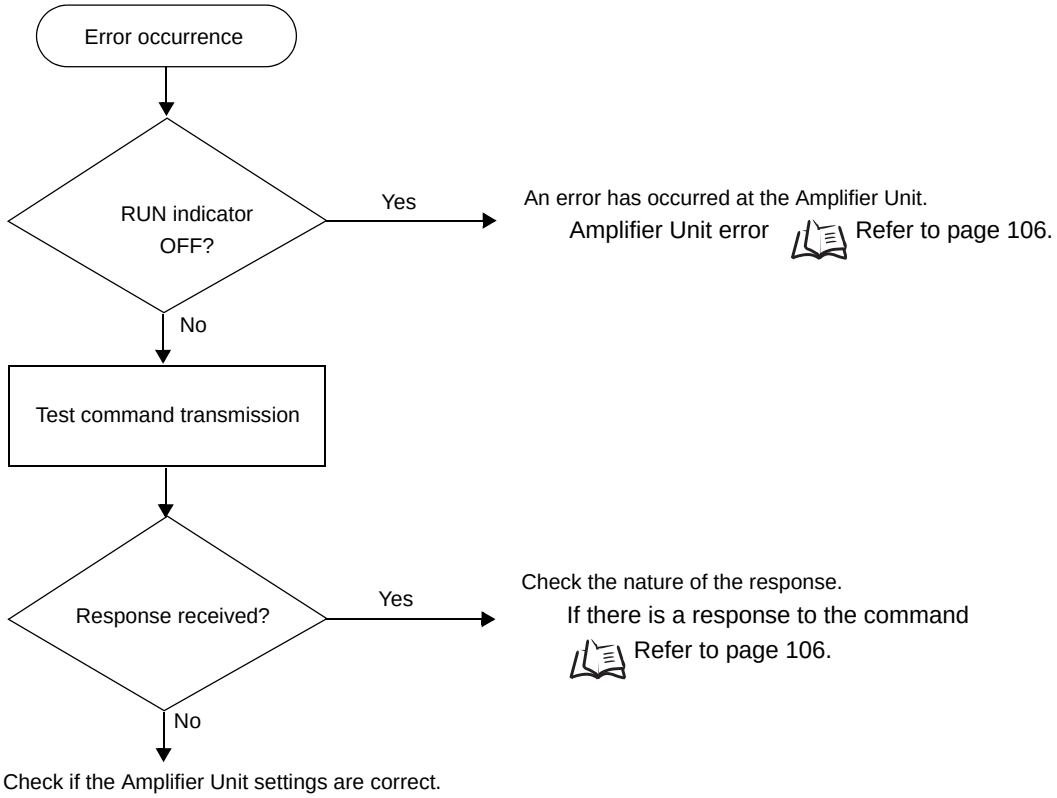
Amplifier Unit Indicators

Name	Indications
RUN (green)	Turns ON when the Amplifier Unit is in normal operation.
COMM (orange)	Turns ON during communications with the host device or during communications with an ID Tag.
NORM (green)	Turns ON when the communications finish with no error.
ERROR (red)	Turns ON when an error occurs during communications with the host device, or during communications with an ID Tag.

Operation Check Flowchart

■ From Installation to Trial Operation

Errors are indicated by whether or not a response to the test command is received and by the status of the Amplifier Unit indicators.



If There Is No Response to the Command: Refer to page 106.

- If the Test Command Was Received Normally:

Indicators

RUN	COMM	NORM	ERROR
☼	☼ (Lights once)	●	●

Response Code for the Response

Type	Response code	Function
Normal	00	The command was received normally.

• Amplifier Unit Error

Check the status of the indicators after transmission of the test command.

After taking appropriate corrective action, restart the Amplifier Unit, send the test command again and check again.

RUN	COMM	NORM	ERROR	Main check points
●	— (If RUN is OFF, the status of the other indicators can be ignored.)			• Influence of background noise (change installation position) • Amplifier Unit power supply If the error cannot be resolved after checking, the Amplifier Unit may be damaged.

• If There Is No Response to the Command:

Check the status of the indicators after transmission of the test command.

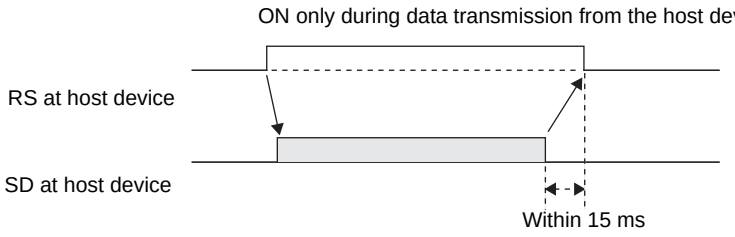
After taking appropriate corrective action, restart the Amplifier Unit, send the test command again and check again.

RUN	COMM	NORM	ERROR	Main check points
☼	●	●	●	• Amplifier Unit baud rate settings • Node numbers of the Amplifier Units (do not match the node number in the test command) • Connection and wiring of the cable between the host device and Amplifier Unit • OFF timing of the RS signals between the host device and Amplifier Unit • Routing of each cable (influence of background noise) If the error cannot be resolved after checking, the Amplifier Unit may be damaged.
☼	●	●	☼ (Lights once)	• Amplifier Unit baud rate settings • Amplifier Unit node number setting (More than one Amplifier Unit may be set to the same node number.) • Connection and wiring of the cable between the host device and Amplifier Unit • Routing of the cables (influence of background noise) • OFF timing of the RS signals between the host device and Amplifier Unit • FCS (frame check sequence) calculation method

CHECK!

Using RS Signal Control at the Host Device

In a 1:N connection using Link Units, the RS signals generated from the host device by normal control must be input as CS signals. Turn the RS signals OFF within 15 ms after the completion of data transmission. Correct communications will not be possible without this control. When using a USB-serial adapter, direct control of the RS signal may not be possible. Test operation in advance to make sure direct control of the RS signal is correct.



• If There Is a Response to the Command:

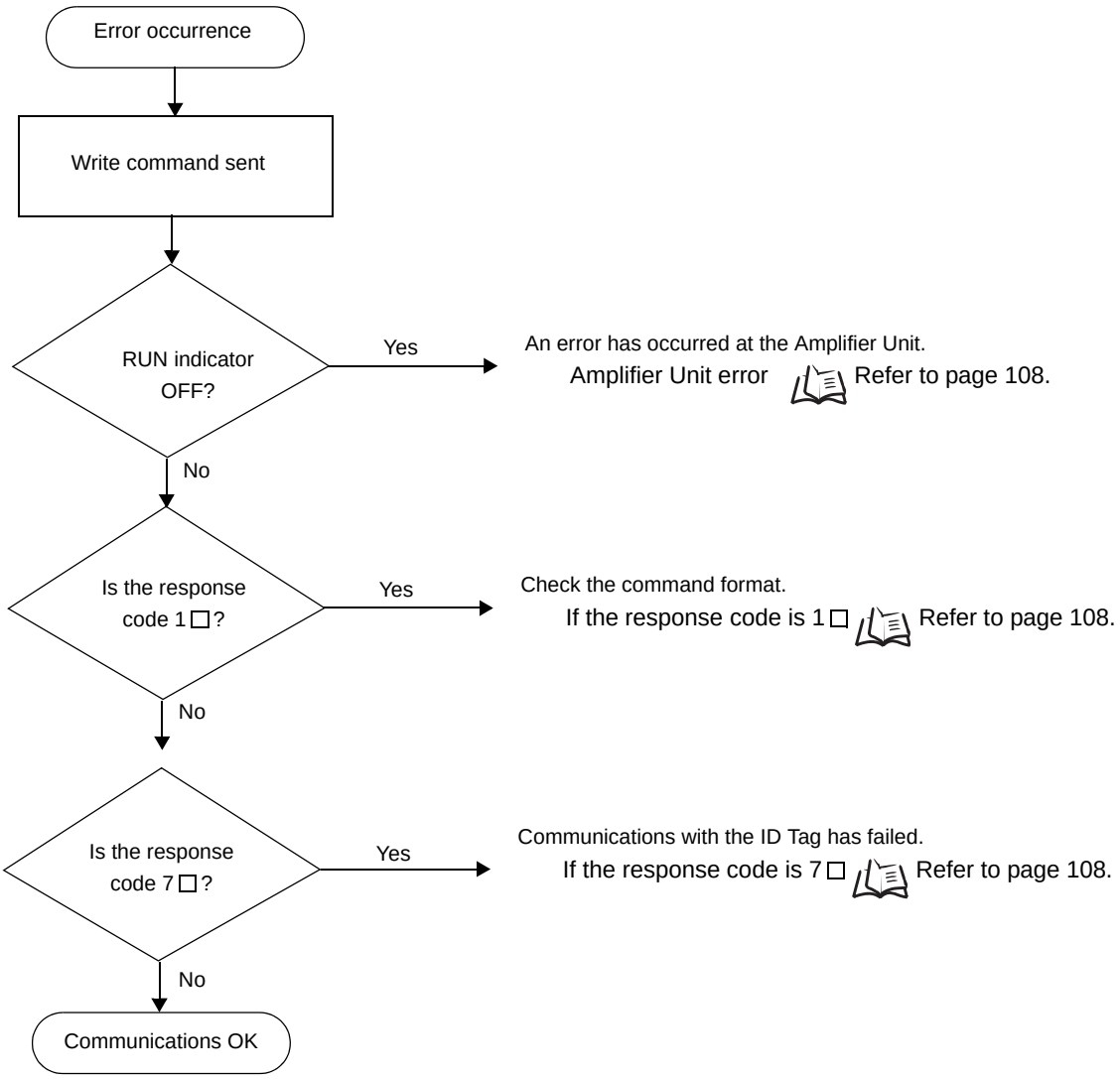
Check the status of the indicators after transmission of the test command.

After taking appropriate corrective action, restart the Amplifier Unit, send the test command again and check again.

RUN	COMM	NORM	ERROR	Main check points
☼	◐	●	◐	• Node numbers of the Amplifier Units (The same number is set for more than one Unit) If the error cannot be resolved after checking, the Amplifier Unit may be damaged.
☼	●	●	☼ (Lights once)	There is a mistake in the command format (number of characters, character code, etc.).

■ From Trial Operation to Communications

Errors are indicated by the status of the indicators after transmission of the write command, and by the response code of the response.



• If the ID Tag Was Processed Normally:

Indicators

RUN	COMM	NORM	ERROR
☼	☼ (Lights once)	☼ (Lights once)	●

Response Code for the Response

Type	Response code	Function
Normal	00	The ID Tag was processed normally.

CHECK!

If there is no response to the write command, refer to the *From Installation to Trial Operation*, *Operation Check Flowchart*. Refer to page 105.

• Amplifier Unit Error

Check the status of the indicators after transmission of the command. After taking appropriate corrective action, send the write command again and check again.

RUN	COMM	NORM	ERROR	Main check points
●	— (If RUN is OFF, the status of the other indicators can be ignored.)			• Influence of background noise (Change installation position) • Amplifier Unit power supply If the error cannot be resolved by checking the two points above, the Amplifier Unit may be damaged.

• If the Response Code is 1□:

There is a host device communications error.

Check the status of the indicators and the response code of the response after transmission of the command. After taking appropriate corrective action, send the write command again and check again.

RUN	COMM	NORM	ERROR
☼	●	●	☼ (Lights once)

Response code	Main check points
14	Command format (Command code, page designation, address designation, processed data volume, etc.)

• If the Response Code is 7☐:

There is a communications error in communications between the CIDRW Head and ID Tag.

Check the status of the indicators and the response code of the response after transmission of the command.After taking appropriate corrective action, send the write command again and check again.

RUN	COMM	NORM	ERROR
☼	☼ (Lights once)	●	☼ (Lights once)

Response code	Main check points
70	• Background noise levels of the CIDRW Head (Check the surroundings with the environmental noise level measurement function) • Distance to another CIDRW Head • Influence of background noise (Change installation position) • Please check the Antenna Connection Status by using “GET PARAMETER“ command. Refer to page 94, page 19. If the error cannot be resolved after checking, the Amplifier Unit may be damaged.
71	• ID Tag overwrite life (Replace the ID Tag) • Environment of use of the ID Tags (ID Tag breakage due to use in unanticipated ways)
72	• Connection to the CIDRW Head • Distance between the ID Tag and CIDRW Head • CIDRW Head background noise levels (Check the surroundings with the environmental noise level measurement function) • Distance to another CIDRW Head • Please check the Antenna Connection Status by using “GET PARAMETER“ command. Refer to page 94, page 19.
7B	• Distance between the ID Tag and CIDRW Head • Background noise levels of the CIDRW Head (Check the surroundings with the environmental noise level measurement function) • Distance to another CIDRW Head • Influence of background noise (Change installation position)
7E 7F	• Type/specifications of the ID Tags used • Settings of the ID Tags used (The ID Tag lock function is used.*) • Environment of use of the ID Tags (ID Tag breakage due to use in unanticipated ways)

* The ID Tag has a lock function, but the Amplifier Unit has no function for locking an ID Tag.

■ Other Troubleshooting

• Operating in Test Mode

Always connect the CIDRW Head before operating the Amplifier Unit in Test Mode. If Test Mode is used with abnormal CIDRW Head cable or without connecting a CIDRW Head, the ERROR indicator will light and Amplifier Unit operation will stop.

RUN	COMM	NORM	ERROR	Main check points
☼	●	●	☼	• Please check that the CIDRW Head is connected correctly. If the error cannot be resolved after checking, the Amplifier Unit or the CIDRW Head may be damaged.

MEMO

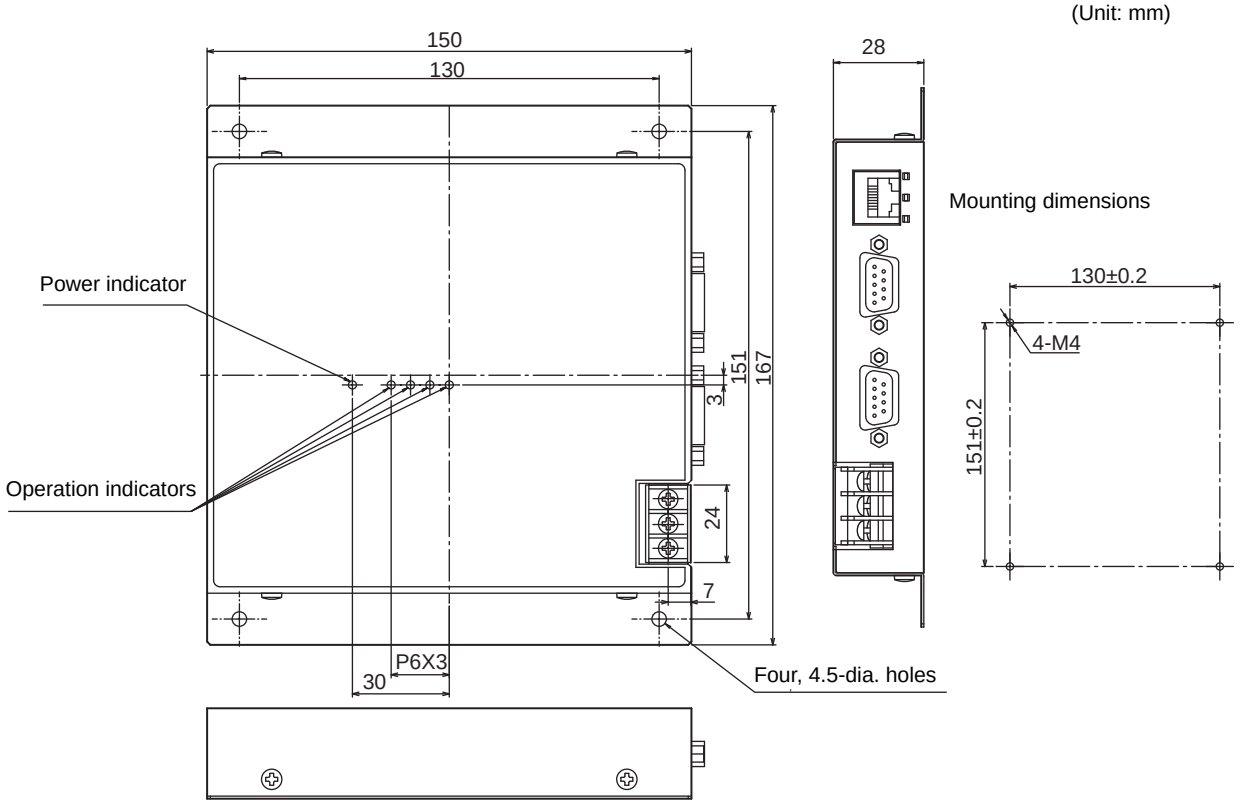
SECTION 6
Appendix

Specifications and Dimensions	112
System Configuration Examples	117
When SECS Is Not Used	118
Characteristic Data According to Conditions of Use	119
ID Tag Memory Maps	149
Regular Inspection	150
SECS Protocol Specifications	151
ASCII Code Table	156
Protective Construction	157

Specifications and Dimensions

Controller
V700-L22

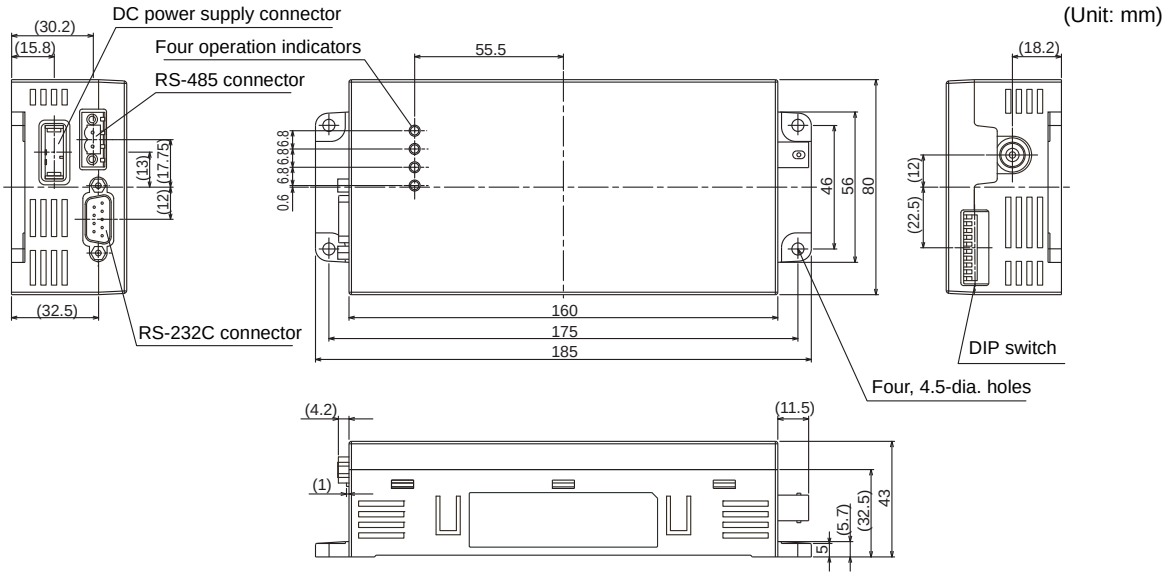
(Unit: mm)



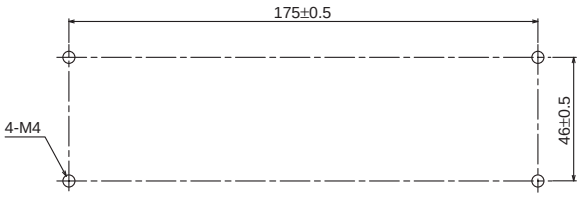
Item	Specifications
Power supply voltage	24 VDC +10% -15%
Current consumption	150 mA max. (inrush current: approx. 10 A max.)
Ambient temperature	Operating: 0 to +40°C Storage: -15 to +65°C (with no icing)
Ambient humidity	Operating: 10% to 85% Storage: 10% to 95% (with no condensation)
Degree of protection	IP20 (IEC60529)
Insulation resistance	50 MΩ min. between power supply terminals and the frame ground terminal (500 VDC M)
Dielectric strength	Leak current not to exceed 3.5 mA on application of 500 VAC (50/60 Hz for 1 minute) between both power supply terminals and the frame ground terminal
Vibration resistance	Frequency: 10 to 150 Hz; double amplitude: 0.20 mm; acceleration: 15 m/s^2 for 8 minutes, 10 times each in X, Y, and Z directions
Shock resistance	Shock of 150 m/s^2 in X, Y, and Z directions, 3 times each for 18 repetitions
Ground	Ground to 100 Ω or less.
Case material	SECC (coating)
Weight	Approx. 580 g

Amplifier Units

V640-HAM11-V4 and V640-HAM11-L-V2



Mounting dimensions

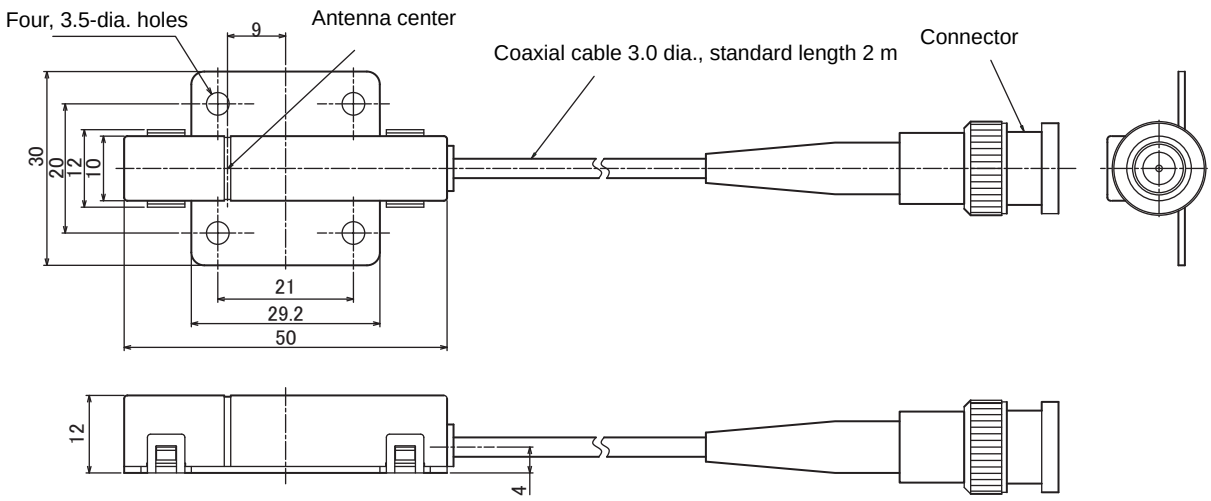


Item	Specifications	
	V640-HAM11-V4	V640-HAM11-L-V2
Power supply voltage	24 VDC +10% -15%	
Current consumption	150 mA max.	400 mA max.
Degree of protection	IP20 (IEC60529: 2001)	
Ambient temperature	Operating: 0 to +40°C Storage: -15 to +65°C (with no icing)	
Ambient humidity	Operating/Storage: 35% to 85% (with no condensation)	
Insulation resistance	20 MΩ min.(with 100 VDC megohmmeter) between power supply terminals and the frame ground terminal	
Dielectric strength	1,000 VAC (50/60 Hz for 1 min.) leak current consumption 5 mA max. between both power supply terminals and the frame ground terminal	
Vibration resistance	10 to 150 Hz, double amplitude: 0.20 mm, Max. Acceleration: 15 m/s² with 10 sweeps for 8 min. each in 3 directions	
Shock resistance	150 m/s², 3 times each in 6directions	
Ground	Ground to 100 Ω or less.	
Case material	PC/ABS resin	
Dimensions	80×185×43 mm (W×D×H, excluding protruding parts)	
Mass	Approx. 250 g	
Frequency	134.2 kHz	
Rediated magnetic field strength	maximum 35 dBμA/m at 10 meters (fixed)	
Environmental pollution degree	Degree 2	
Over voltage category	Category I	
Mounting method	Secured with four M4 screws. (tightening torque: 1.2N·M)	
CIDRW Head	V640-HS61	V640-HS62

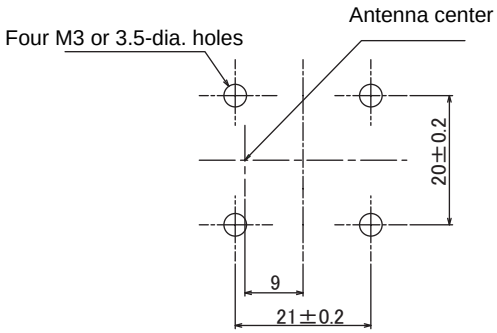
CIDRW Heads

V640-HS61

(Unit: mm)



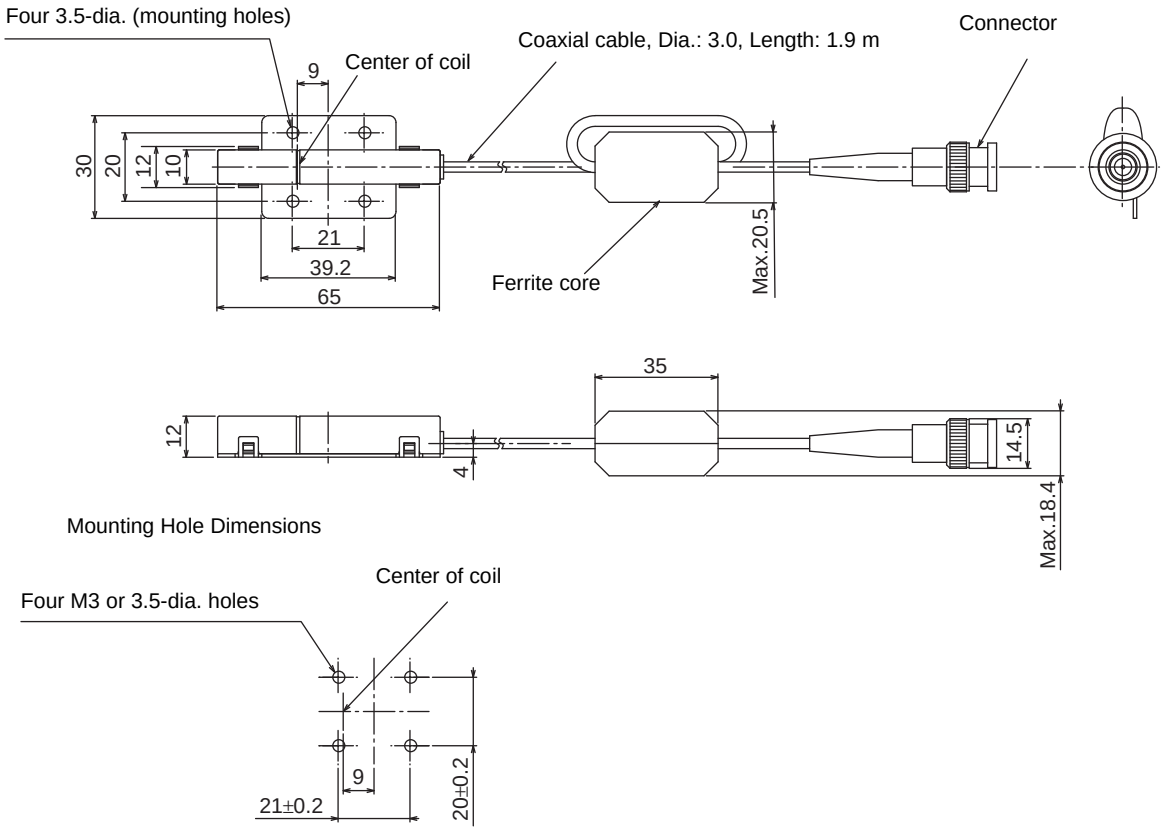
Mounting dimensions



Item	Specifications
Transmission frequency	134 kHz
Ambient temperature	Operating: 0 to +40°C Storage: -15 to +65°C (with no icing)
Ambient humidity	Operating/Storage: 35% to 85% (with no condensation)
Degree of protection	IP60 (IEC60529)
Insulation resistance	20 MΩ min. between all terminals and the case (100 VDC M)
Dielectric strength	Leak current not to exceed 5 mA on application of 1000 VAC (50/60 Hz for 1 minute) between all terminals and the case
Vibration resistance	Frequency: 10 to 150 Hz; double amplitude: 0.20 mm; acceleration: 15 m/s^2 for 8 minutes, 10 times each in X, Y, and Z directions
Shock resistance	Shock of 150 m/s^2 in X, Y, and Z directions, 3 times each for 18 repetitions
Casing material	ABS/epoxy resin Stainless steel mount
Weight	Approx. 70 g
Cable length	2 m
Cable specification	3-mm-dia. coaxial cable

V640-HS62

(Unit: mm)

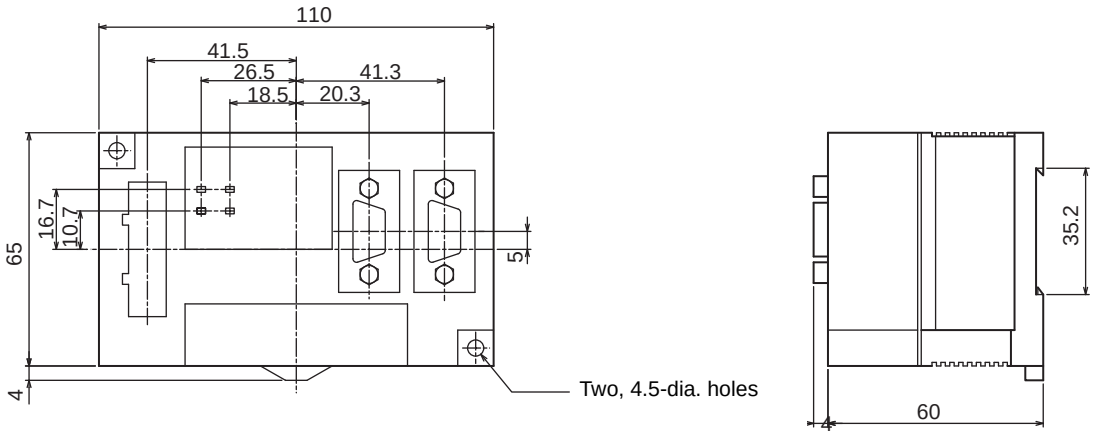


Mounting Hole Dimensions

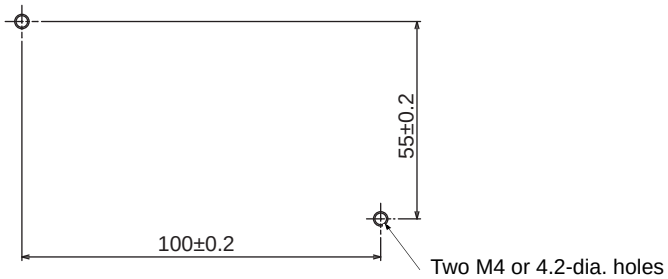
Item	Specifications
Transmission frequency	134 kHz
Ambient temperature	Operating: 0 to +40°C Storage: -15 to +65°C (with no icing)
Ambient humidity	Operating/Storage: 35% to 85% (with no condensation)
Degree of protection	IP60 (IEC60529)
Insulation resistance	20 MΩ min. between all terminals and the case (100 VDC M)
Dielectric strength	Leak current not to exceed 5 mA on application of 1000 VAC (50/60 Hz for 1 minute) between all terminals and the case
Vibration resistance	Frequency: 10 to 150 Hz; double amplitude: 0.20 mm; acceleration: 15 m/s^2 for 8 minutes, 10 times each in X, Y, and Z directions
Shock resistance	Shock of 150 m/s^2 in X, Y, and Z directions, 3 times each for 18 repetitions
Casing material	ABS/epoxy resin Stainless steel mount
Weight	Approx. 100 g
Cable length	1.9 m
Cable specification	3-mm-dia. coaxial cable

Link Unit
V700-L11

(Unit: mm)



Mounting dimensions

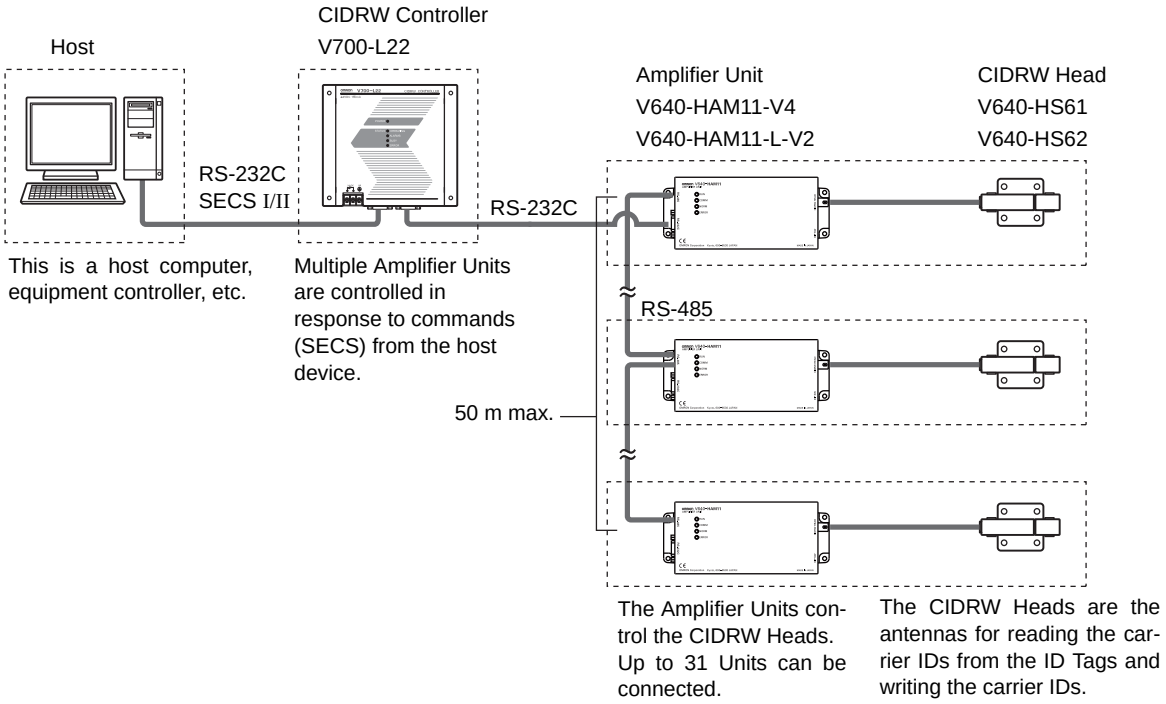


Item	Specifications
Power supply voltage	24 VDC +10% -15%
Current consumption	250 mA max. (inrush current: approx. 10 A)
Ambient temperature	Operating: 0 to +40°C Storage: -15 to +50°C (with no icing)
Ambient humidity	Operating/Storage: 35% to 85% (with no condensation)
Degree of protection	IP20 (IEC60529)
Insulation resistance	50 MΩ min. between power supply terminals and the frame ground terminal (500 VDC M)
Dielectric strength	Leak current not to exceed 5 mA on application of 1000 VAC (50/60 Hz for 1 minute) between power supply terminals and the frame ground terminal
Vibration resistance	Frequency: 10 to 150 Hz; double amplitude: 0.20 mm; acceleration: 15 m/s^2 for 8 minutes, 10 times each in X, Y, and Z directions
Shock resistance	Shock of 150 m/s^2 in X, Y, and Z directions, 3 times each for 18 repetitions
Ground	Ground to 100 Ω or less.
Case material	PC/ABS resin
Weight	Approx. 200 g

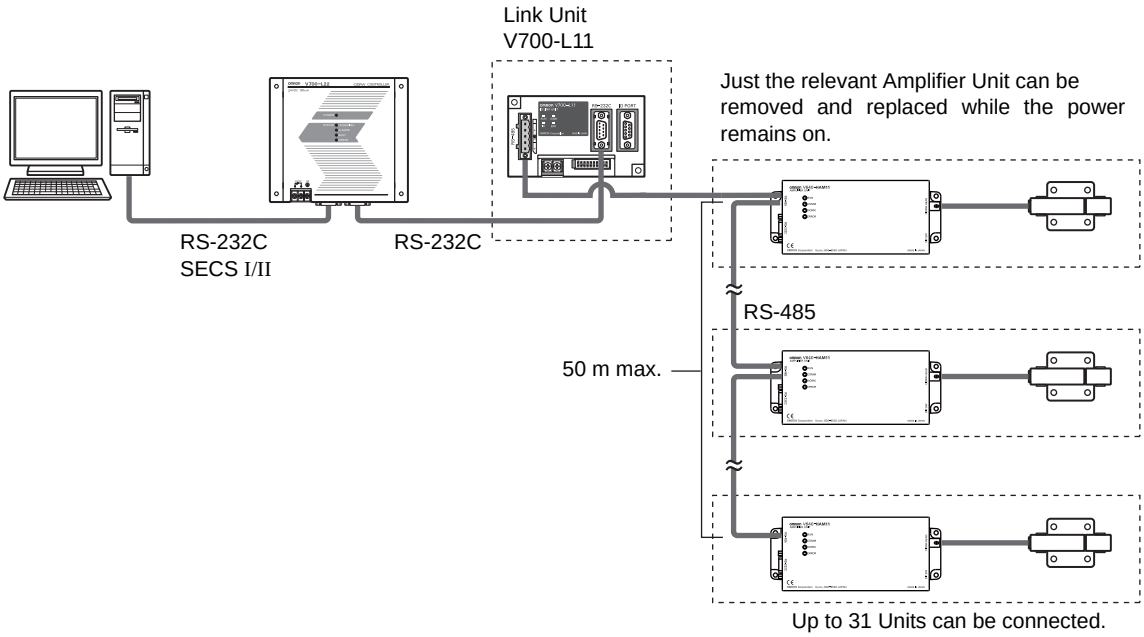
System Configuration Examples

When SECS Is Used

Communications with the host device is possible using the SECS protocol.

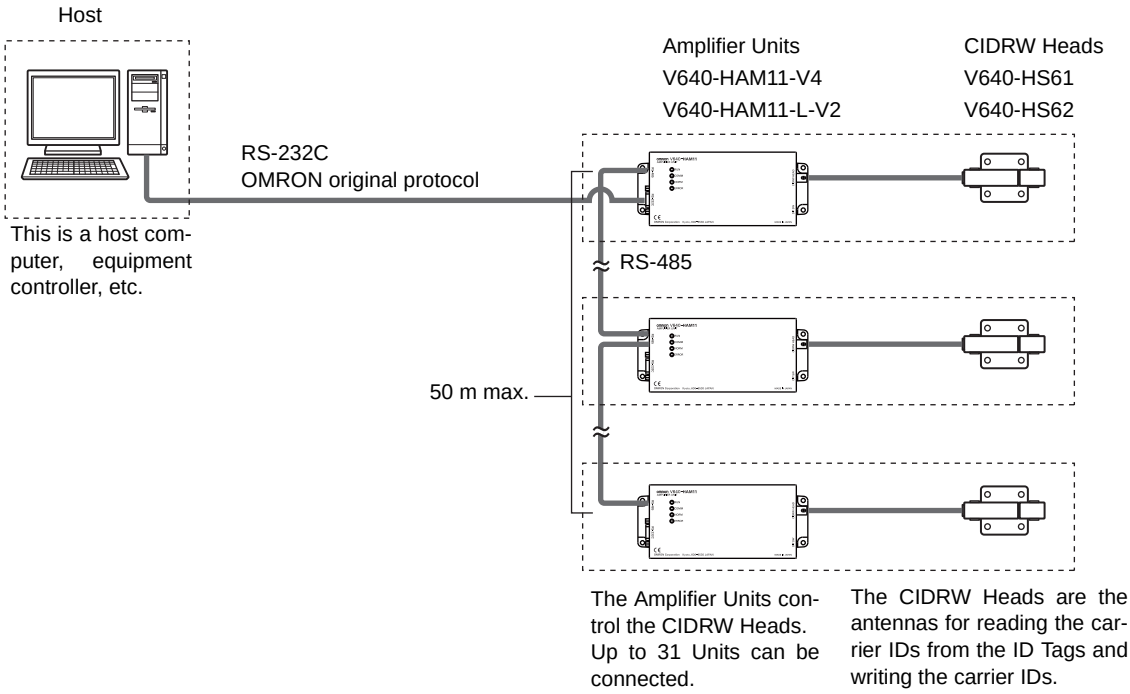

CIDRW Controller
V700-L22
Host
Amplifier Unit
V640-HAM11-V4
V640-HAM11-L-V2
CIDRW Head
V640-HS61
V640-HS62
RS-232C
SECS I/II
RS-232C
RS-485
50 m max.
This is a host computer, equipment controller, etc.
Multiple Amplifier Units are controlled in response to commands (SECS) from the host device.
The Amplifier Units control the CIDRW Heads. Up to 31 Units can be connected.
The CIDRW Heads are the antennas for reading the carrier IDs from the ID Tags and writing the carrier IDs.

With the above system configuration, the Amplifier Unit connected directly to the CIDRW Controller converts signals from RS-232C to RS-485. If this Amplifier Unit is removed, communications will not be possible with the other Amplifier Units. If the Amplifier Unit connected directly to the CIDRW Controller must be removed while the system is operating, insert a Link Unit (V700-L11) between the CIDRW Controller and the first Amplifier Unit. If an Amplifier Unit on the end of the network is removed, be sure to turn ON the terminating resistance on the Amplifier Unit that will end up on the end of the network while the Amplifier Unit is removed.

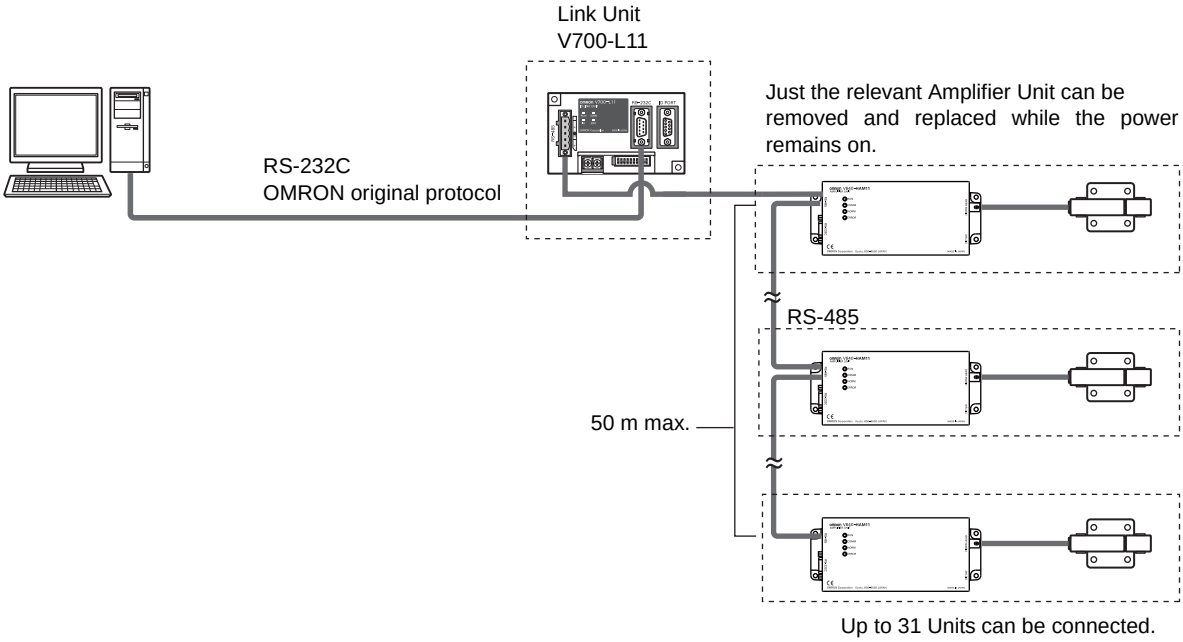


When SECS Is Not Used

Communications with the host device follow the OMRON proprietary protocol.
The Amplifier Units are connected directly to the host device without using a CIDRW Controller.


Host
Amplifier Units
V640-HAM11-V4
V640-HAM11-L-V2
CIDRW Heads
V640-HS61
V640-HS62
RS-232C
OMRON original protocol
This is a host computer, equipment controller, etc.
RS-485
50 m max.
The Amplifier Units control the CIDRW Heads. Up to 31 Units can be connected.
The CIDRW Heads are the antennas for reading the carrier IDs from the ID Tags and writing the carrier IDs.

With the above system configuration, the Amplifier Unit connected directly to the CIDRW Controller converts signals from RS-232C to RS-485. If this Amplifier Unit is removed, communications will not be possible with the other Amplifier Units. If the Amplifier Unit connected directly to the CIDRW Controller must be removed while the system is operating, insert a Link Unit (V700-L11) between the CIDRW Controller and the first Amplifier Unit. If an Amplifier Unit on the end of the network is removed, be sure to turn ON the terminating resistance on the Amplifier Unit that will end up on the end of the network while the Amplifier Unit is removed.


Link Unit
V700-L11
Just the relevant Amplifier Unit can be removed and replaced while the power remains on.
RS-232C
OMRON original protocol
RS-485
50 m max.
Up to 31 Units can be connected.

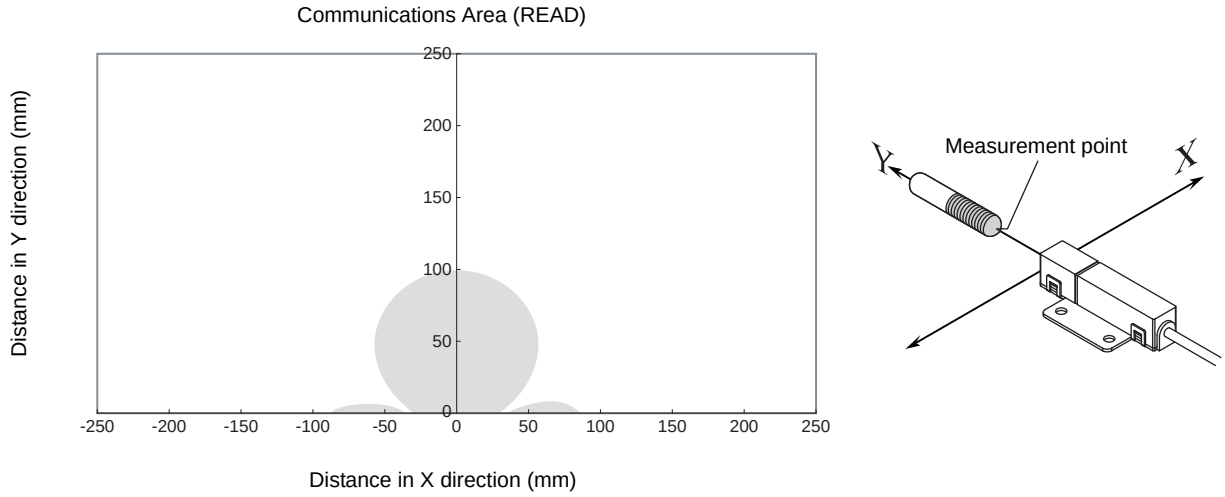
Characteristic Data According to Conditions of Use

Maps of Communications Areas (Reference Only)

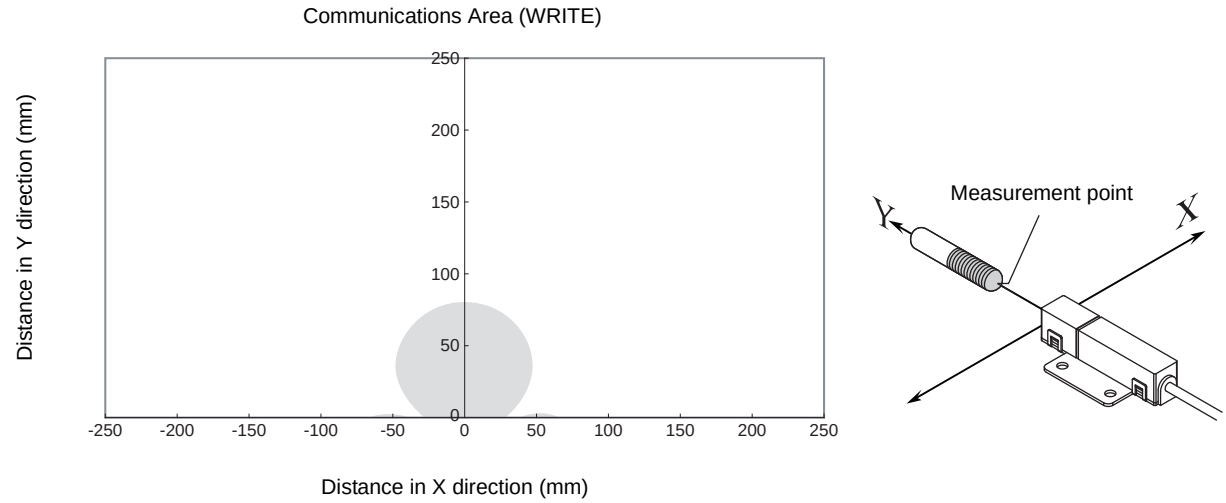
The figures given below for communications areas (communications distances) are reference values only. The maps of communications areas will vary according to the ID Tags that you use, the background metals, the ambient noise, the effects of temperature and so on, and should be thoroughly confirmed on installation. The direction of the ID Tags will affect communications performance. Check the direction of the coils in the ID Tags before using the ID Tags.

■ V640-HAM11-V4

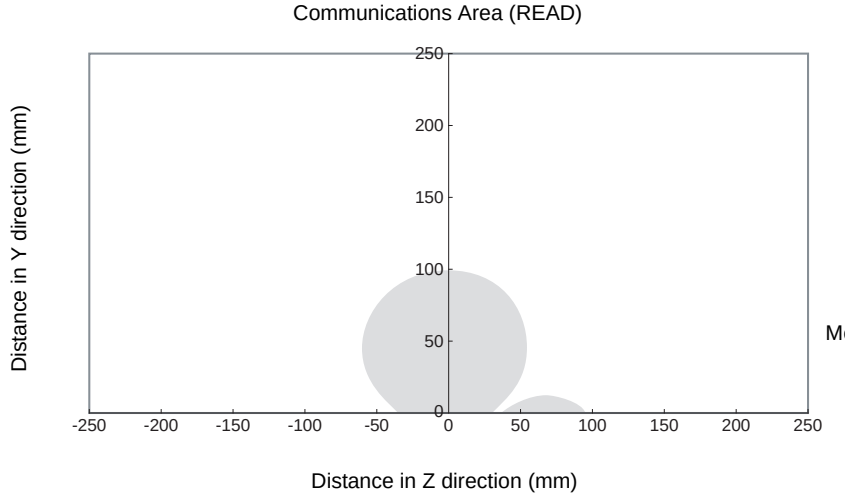
- Coaxial Mounting (RI-TRP-DR2B-30)
  - READ



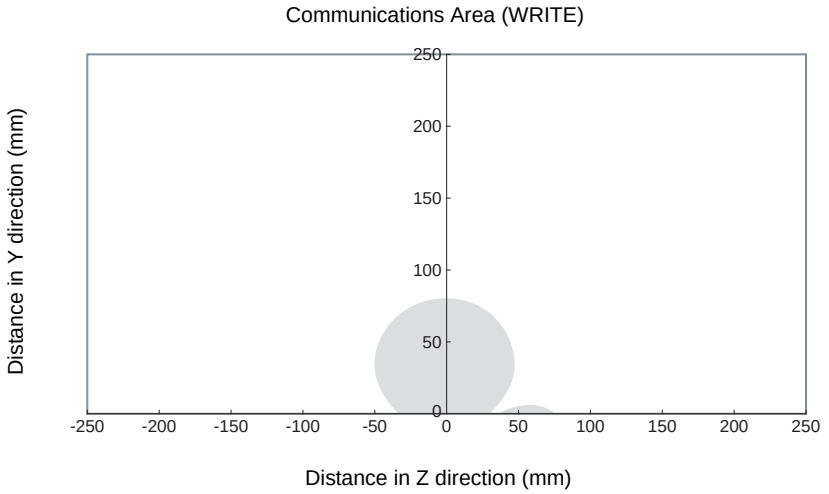
  - WRITE



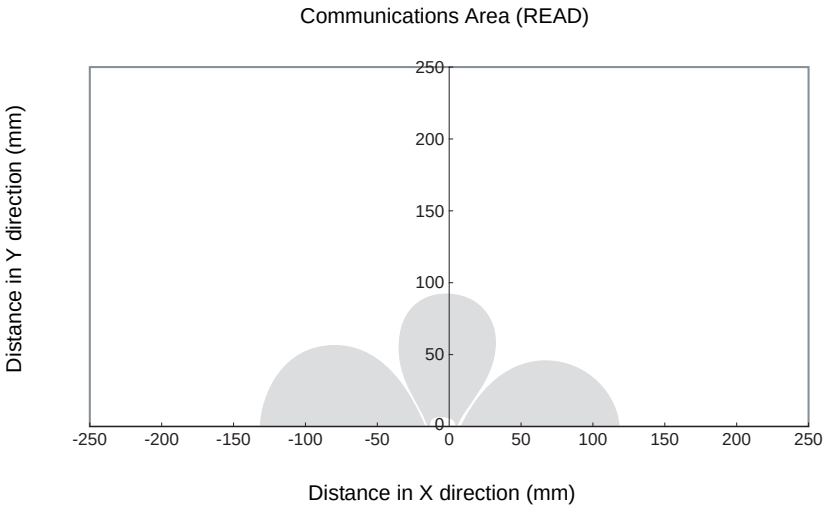
- Coaxial Mounting (RI-TRP-DR2B-30)
  - READ

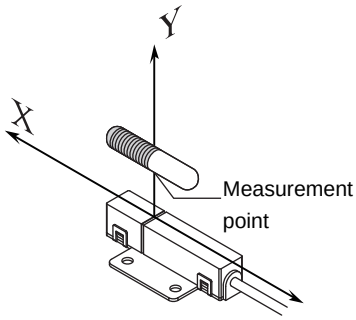


  - WRITE

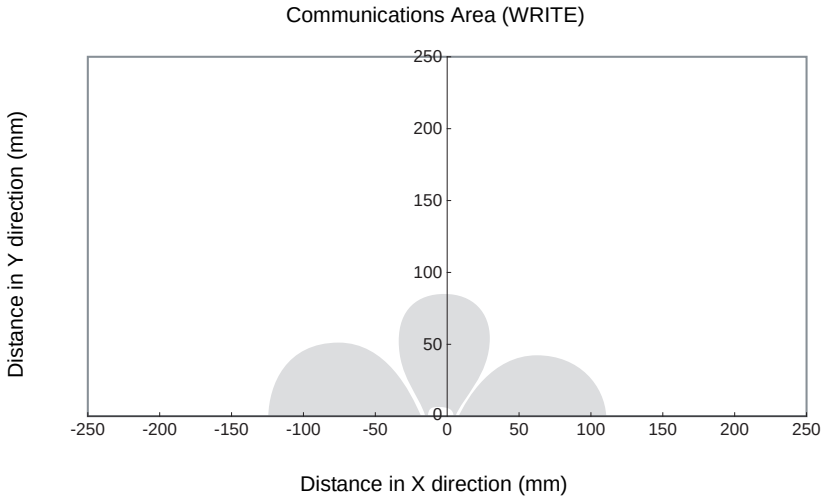


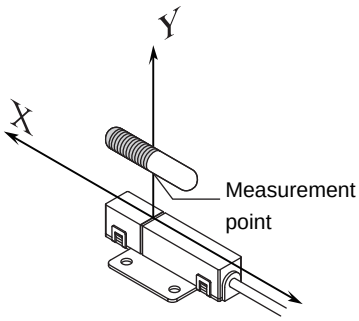
- Parallel Mounting (RI-TRP-DR2B-30)
  - READ



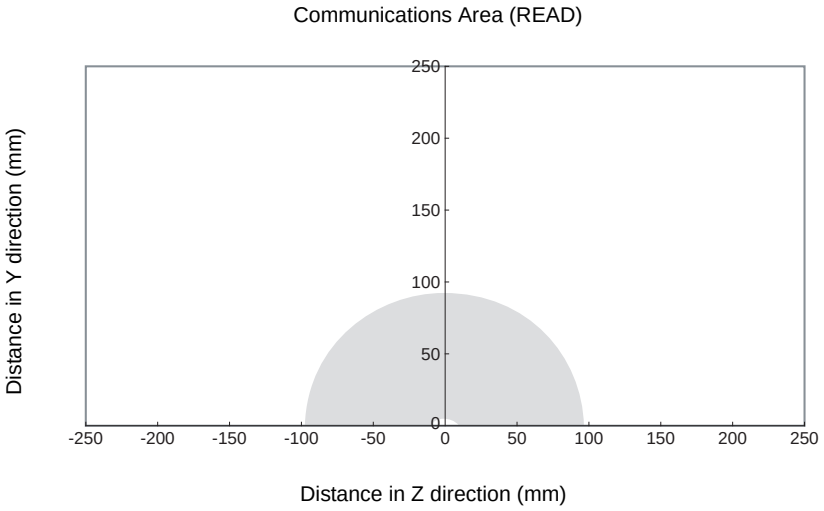


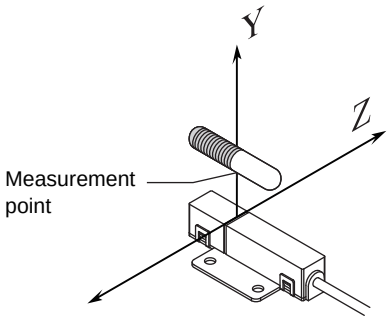
  - WRITE



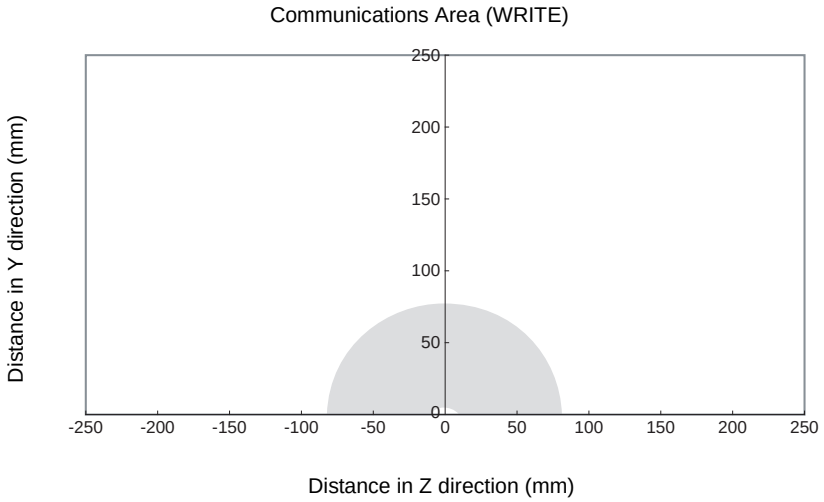


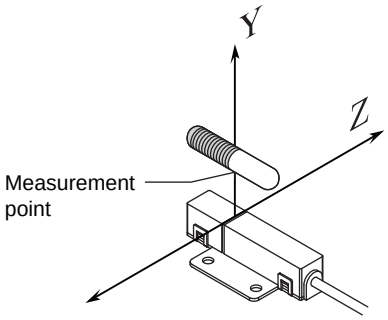
- Parallel Mounting (RI-TRP-DR2B-30)
  - READ



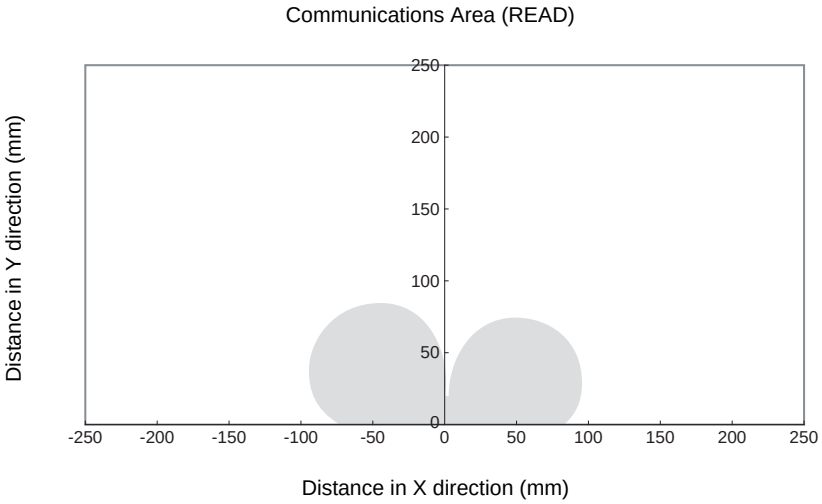


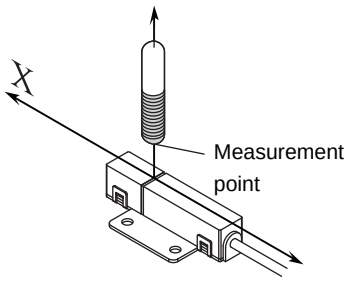
  - WRITE



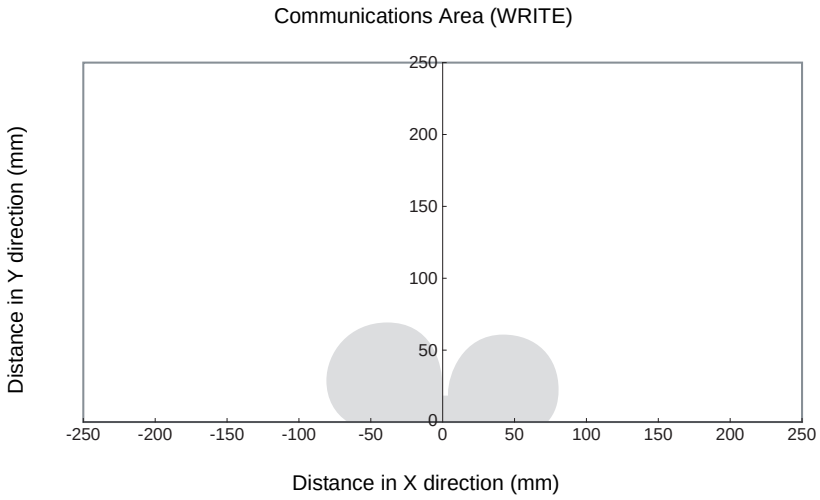


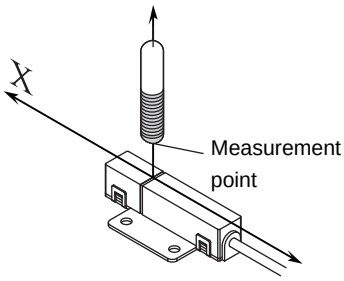
- Vertical Mounting (RI-TRP-DR2B-30)
  - READ



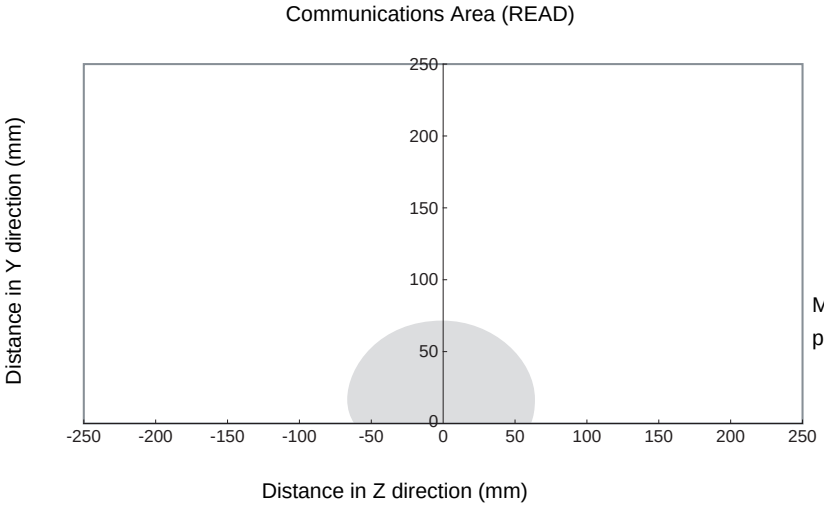


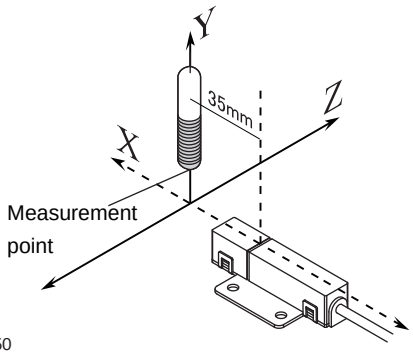
  - WRITE



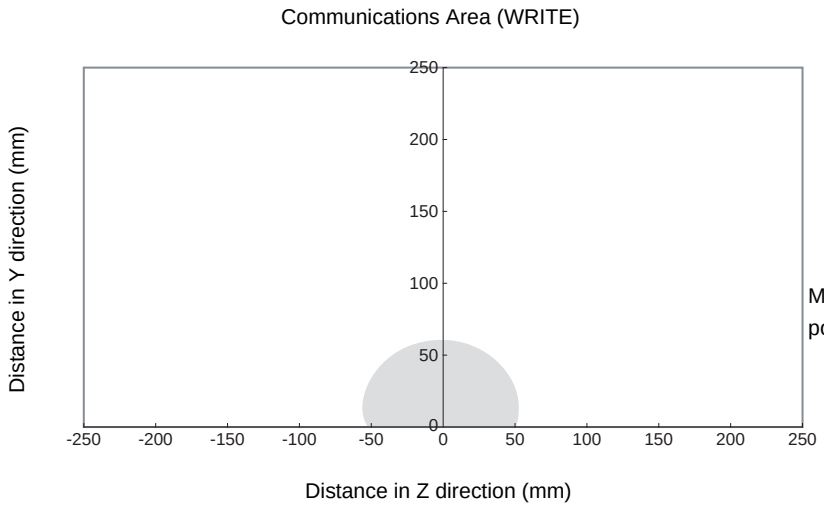


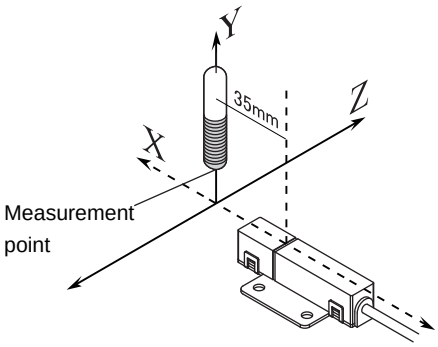
- Vertical Mounting (RI-TRP-DR2B-30)
  - READ



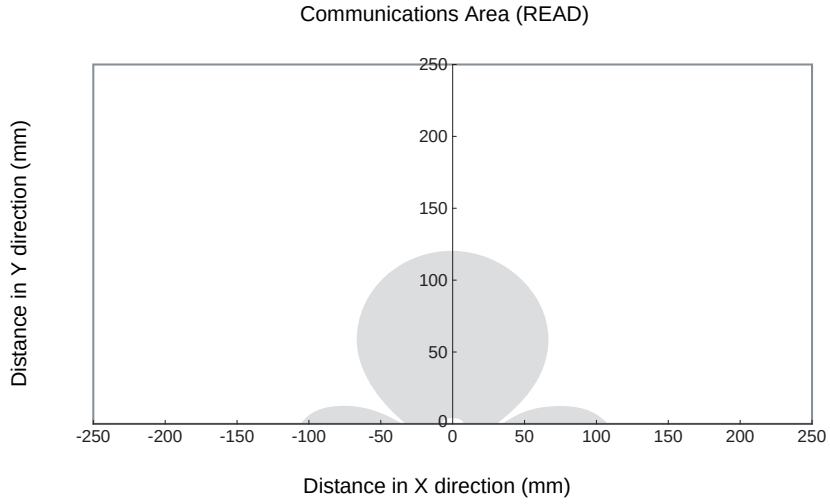


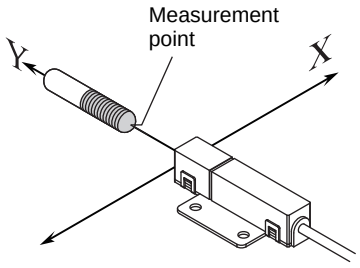
  - WRITE



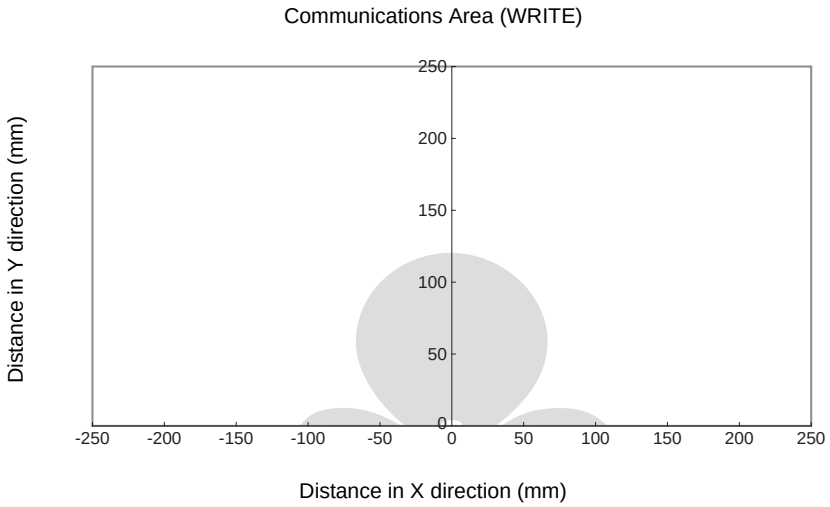


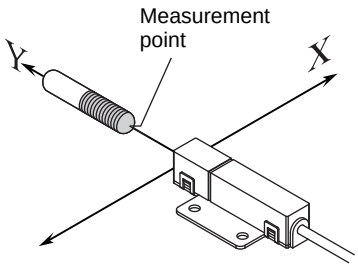
- Coaxial Mounting (RI-TRP-WR2B)
  - READ



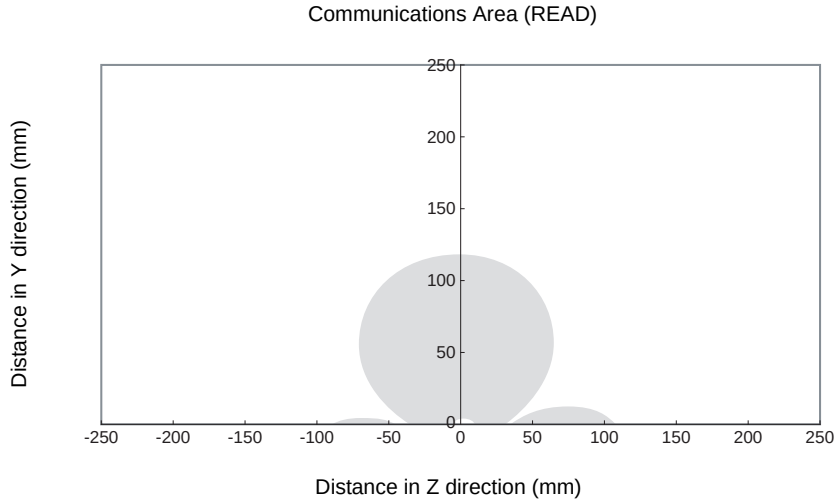


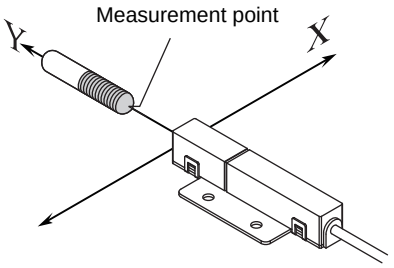
  - WRITE



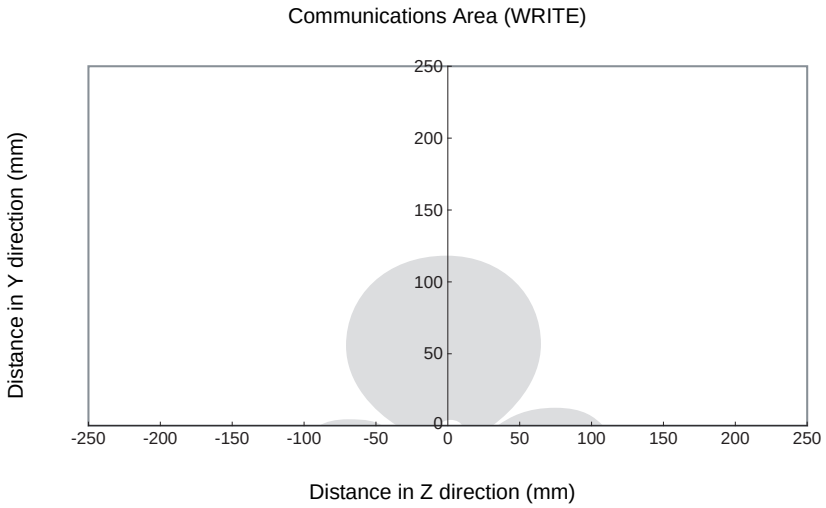


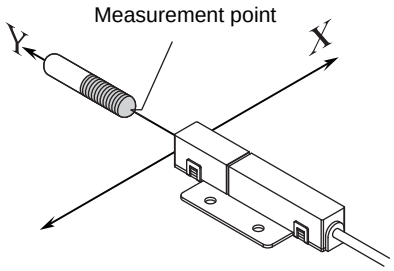
- Coaxial Mounting (RI-TRP-WR2B)
  - READ



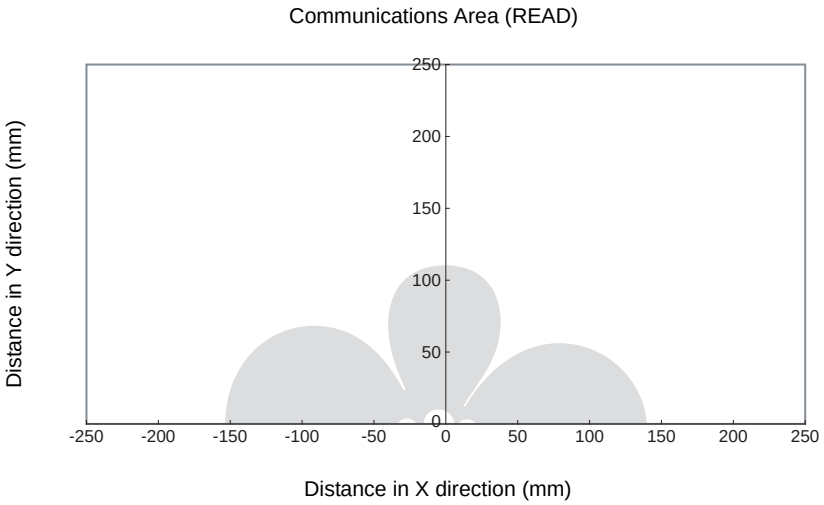


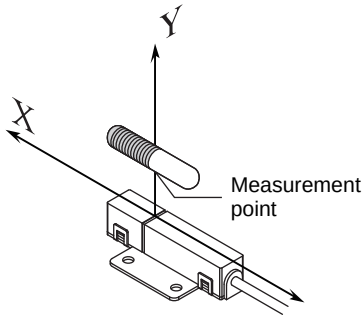
  - WRITE



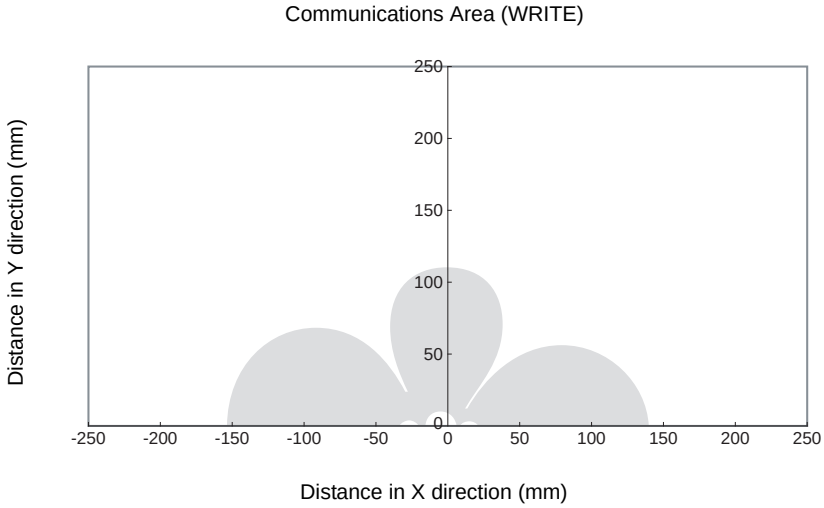


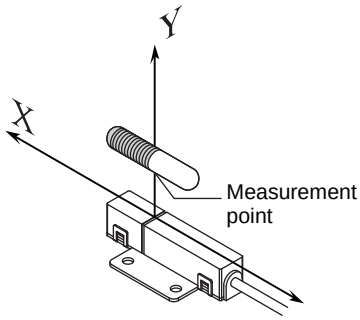
- Parallel Mounting (RI-TRP-WR2B)
  - READ



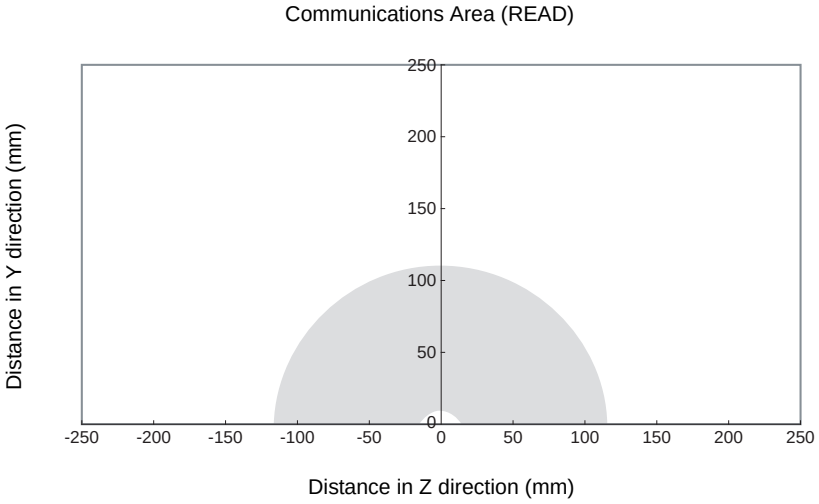


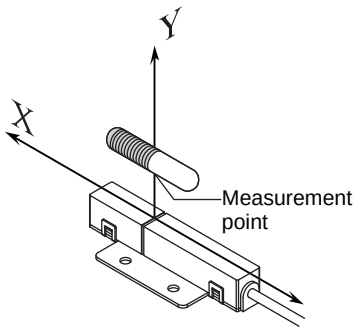
  - WRITE



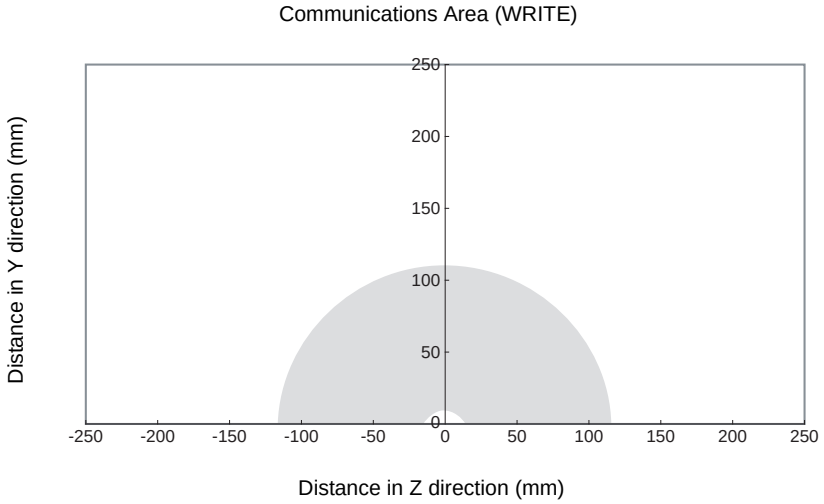


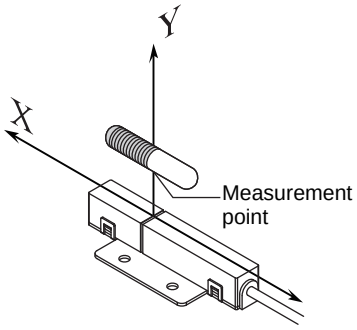
- Parallel Mounting (RI-TRP-WR2B)
  - READ



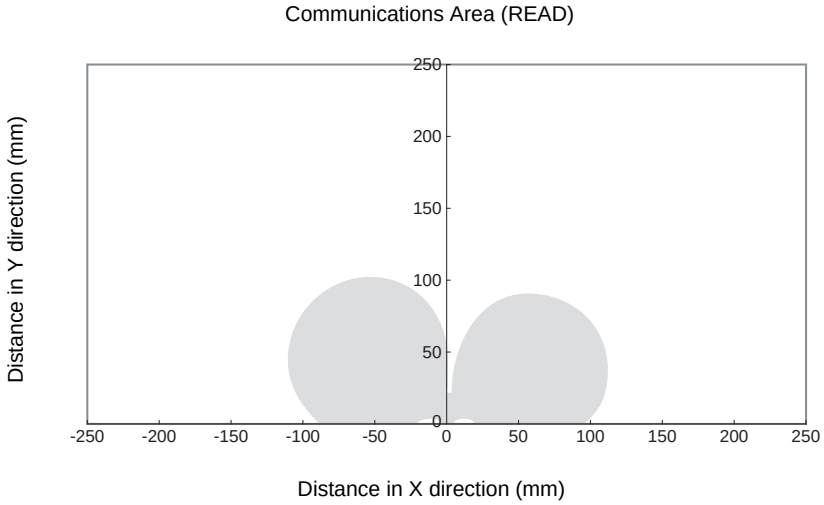


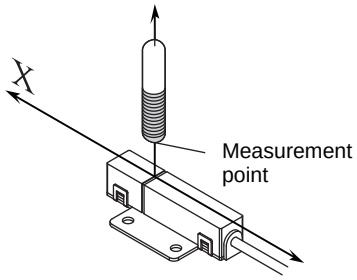
  - WRITE



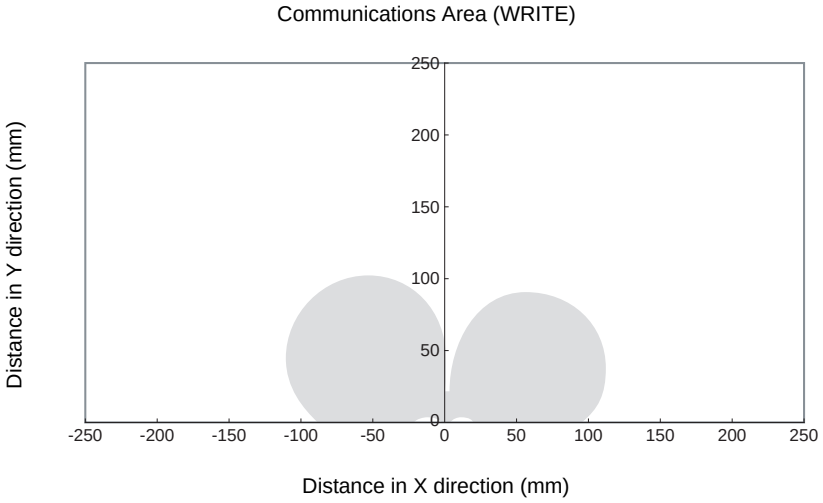


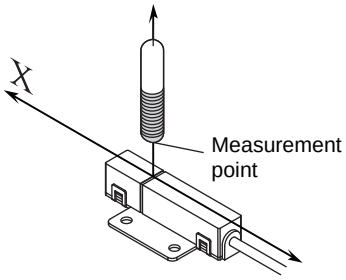
- Vertical Mounting (RI-TRP-WR2B)
  - READ



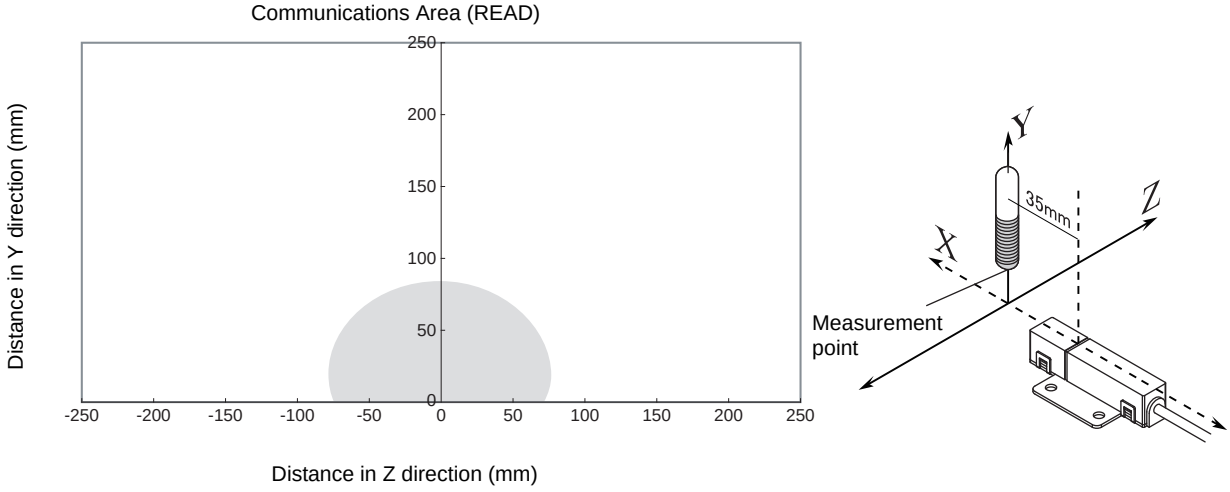


  - WRITE

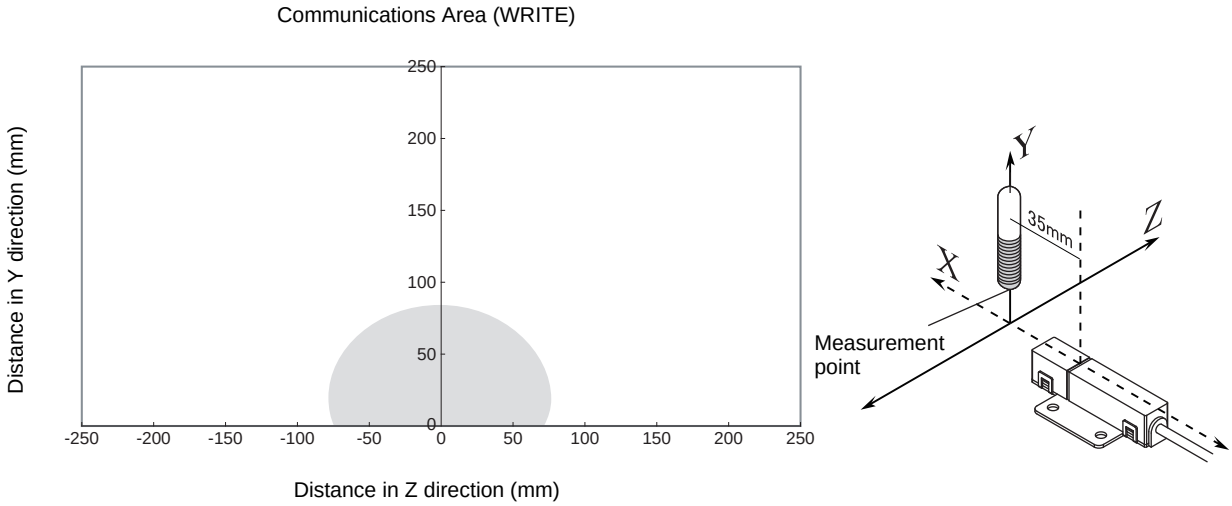




- Vertical Mounting (RI-TRP-WR2B)
  - READ



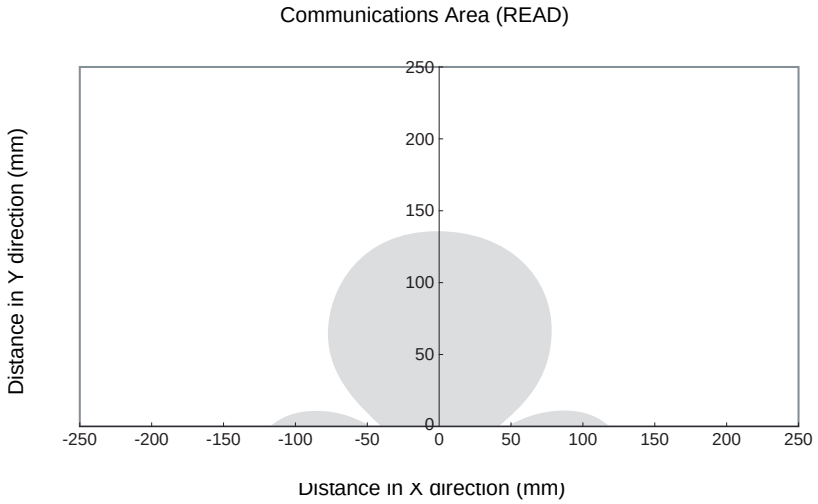
  - WRITE

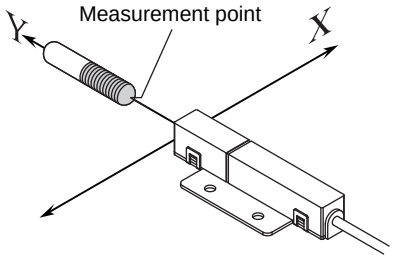


■ V640-HAM11-L-V2

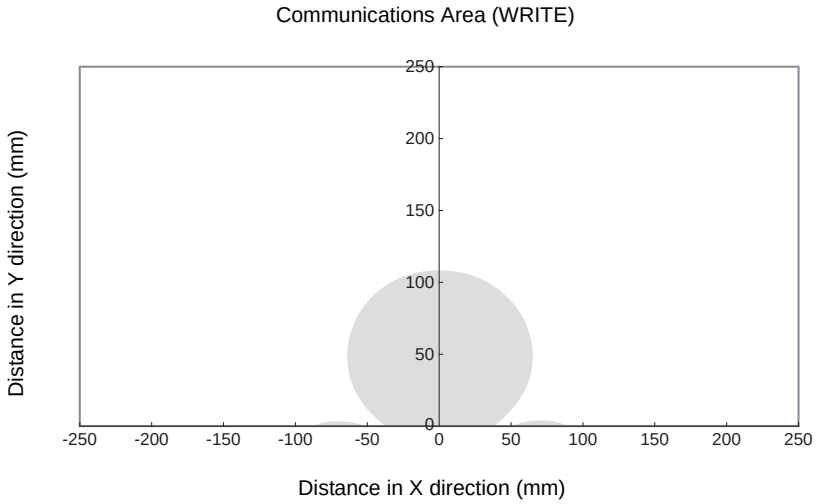
• Coaxial Mounting (RI-TRP-DR2B-30)

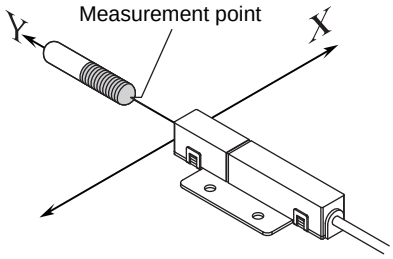
• READ



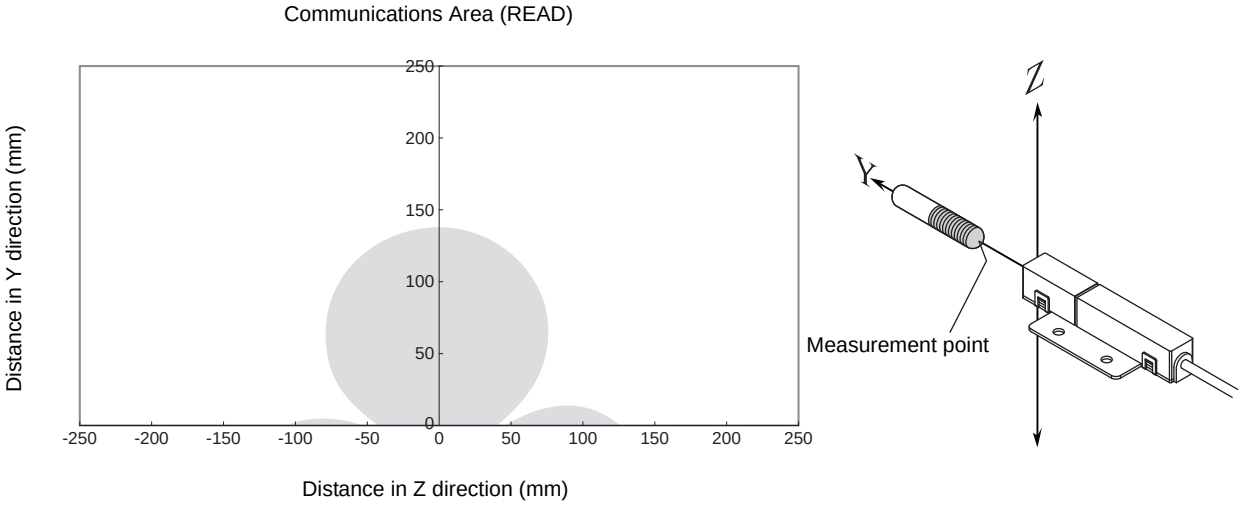


• WRITE

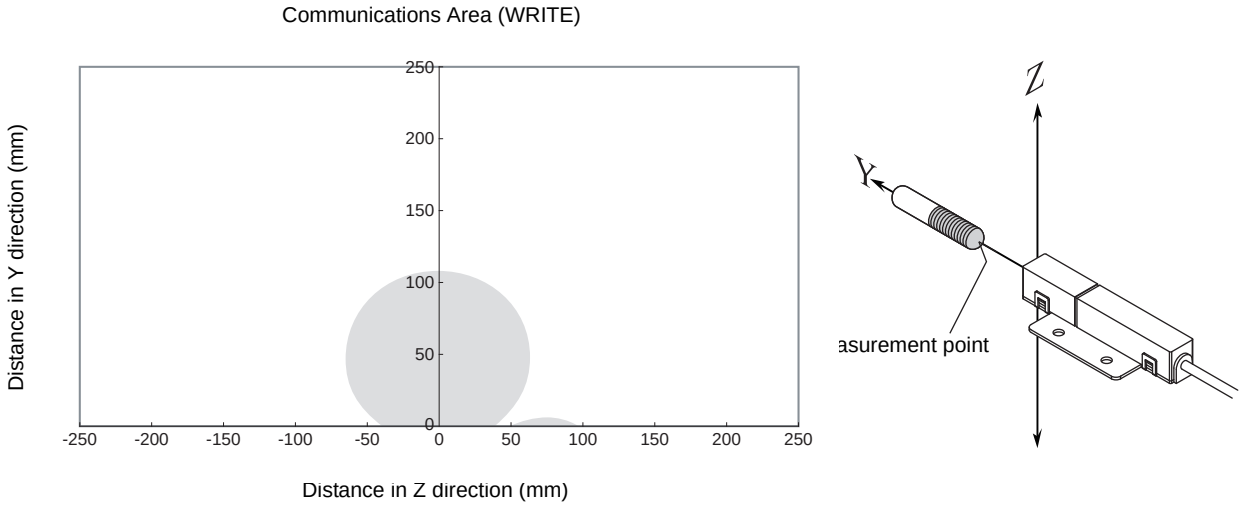




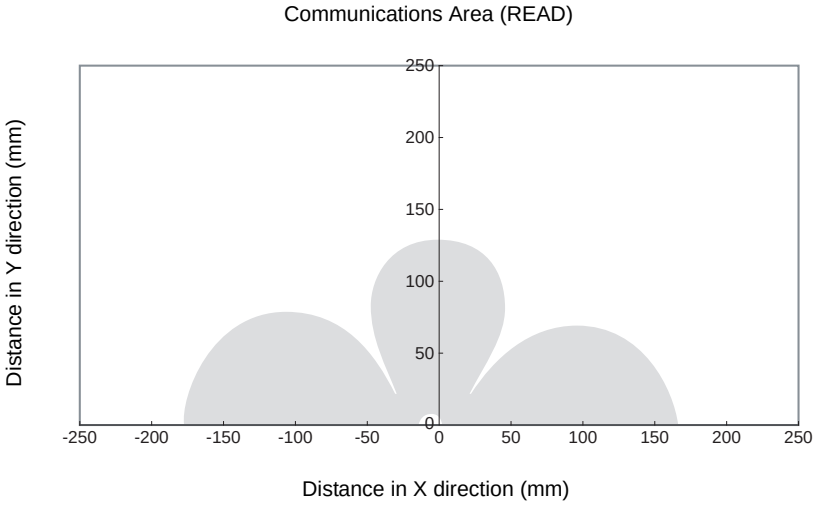
- Coaxial Mounting (RI-TRP-DR2B-30)
  - READ

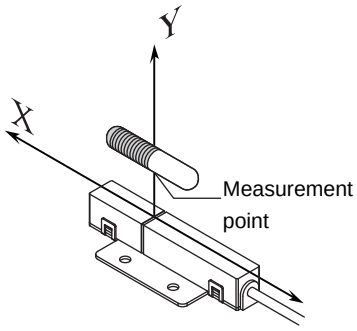


  - WRITE

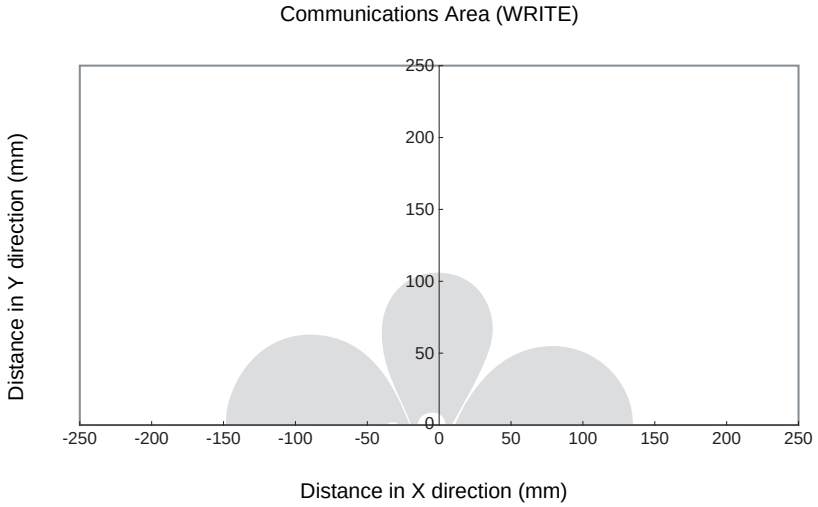


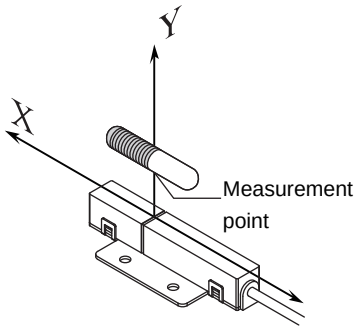
- Parallel Mounting (RI-TRP-DR2B-30)
  - READ



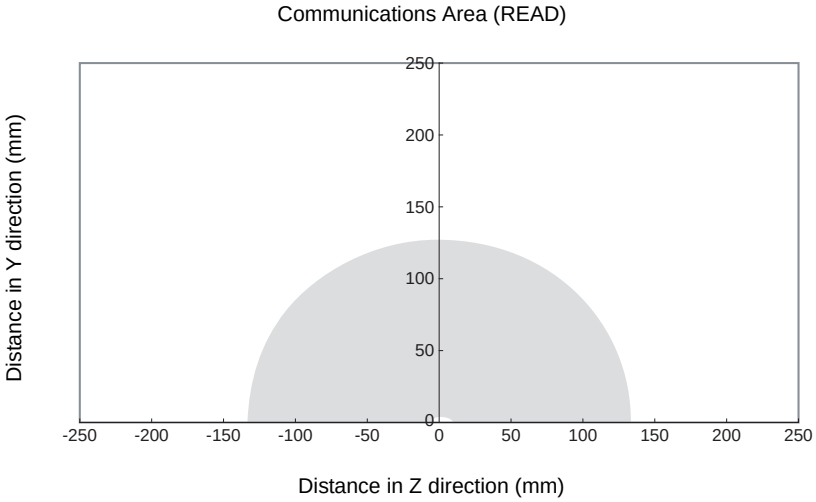


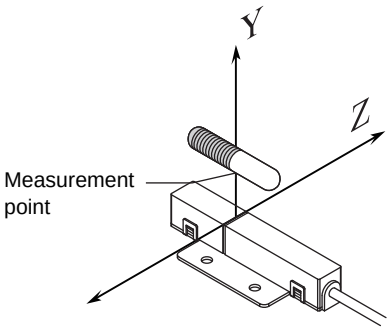
  - WRITE



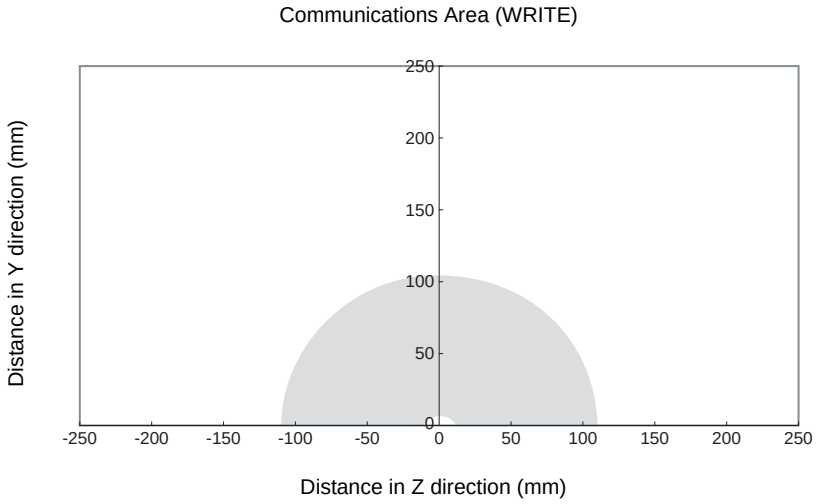


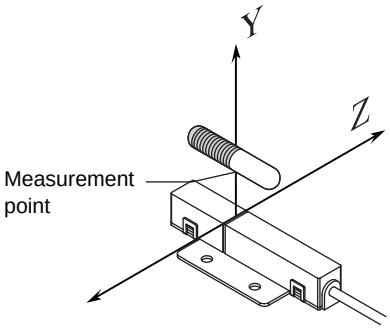
- Parallel Mounting (RI-TRP-DR2B-30)
  - READ



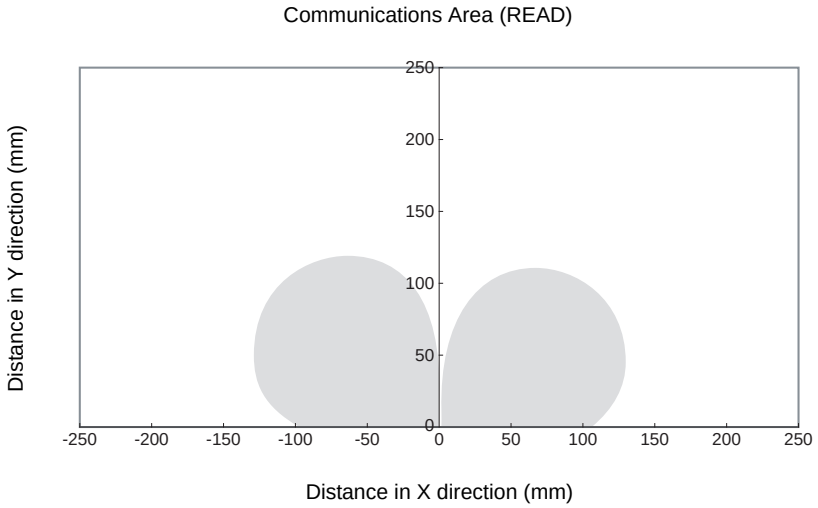


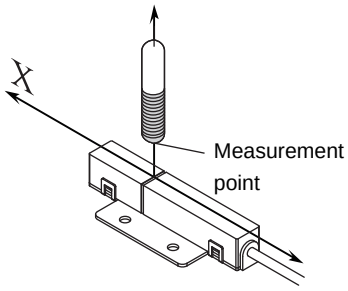
  - WRITE



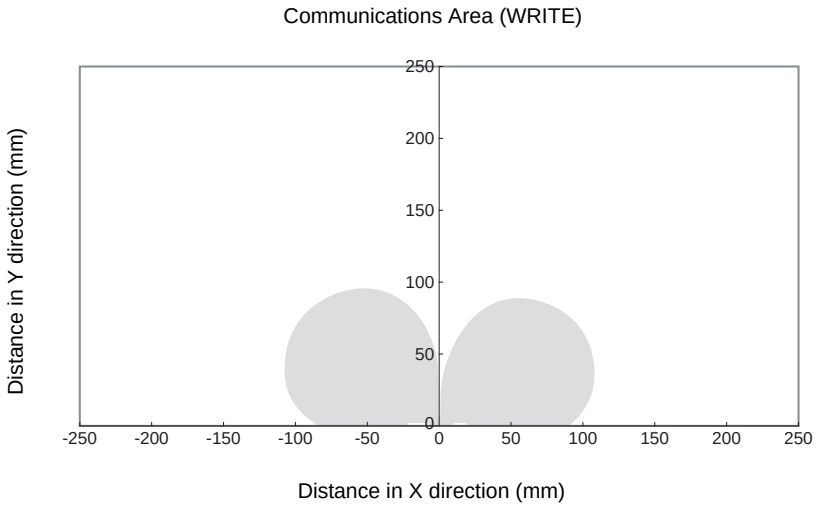


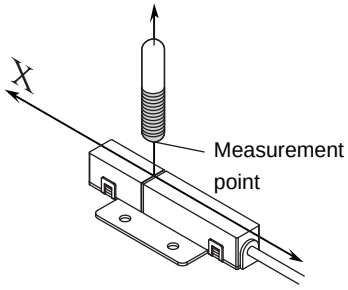
- Vertical Mounting (RI-TRP-DR2B-30)
  - READ



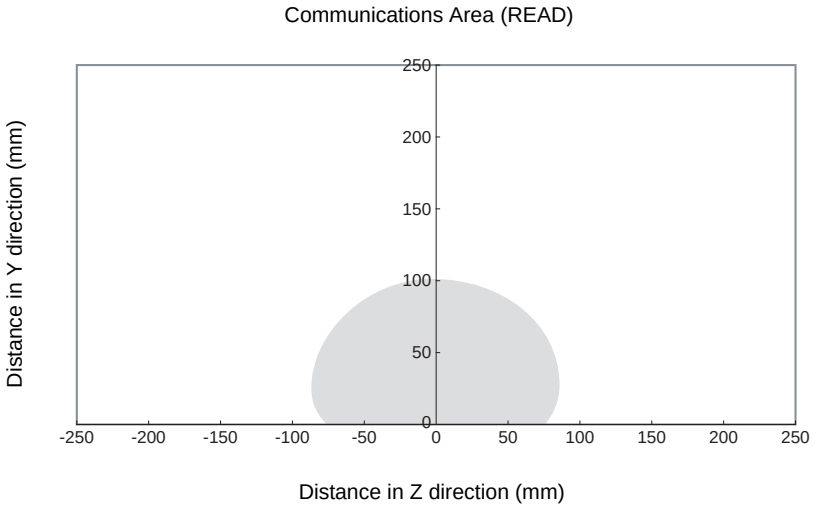


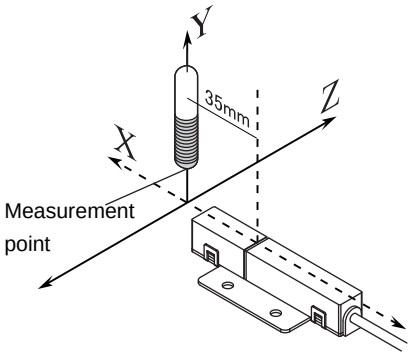
  - WRITE



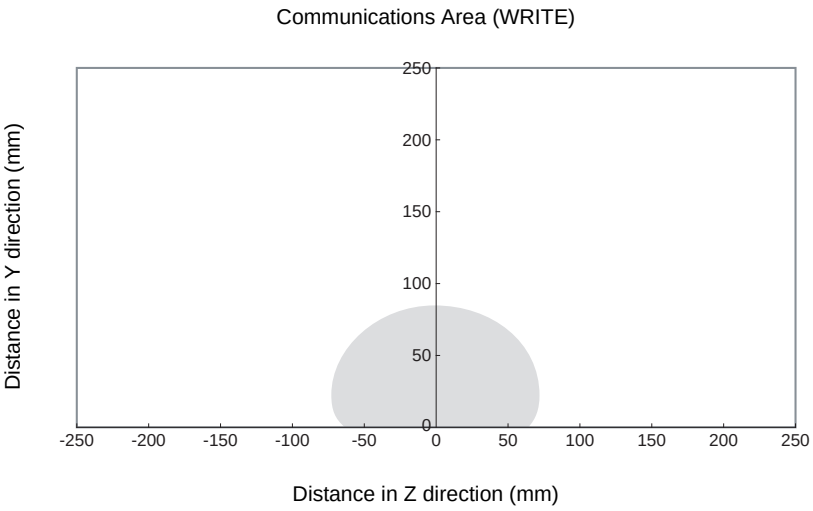


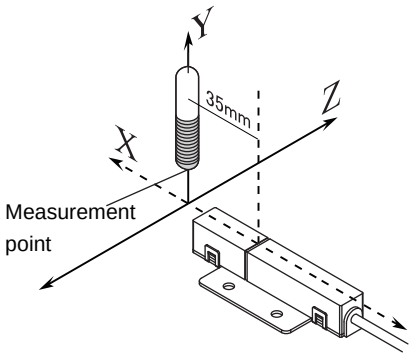
- Vertical Mounting (RI-TRP-DR2B-30)
  - READ



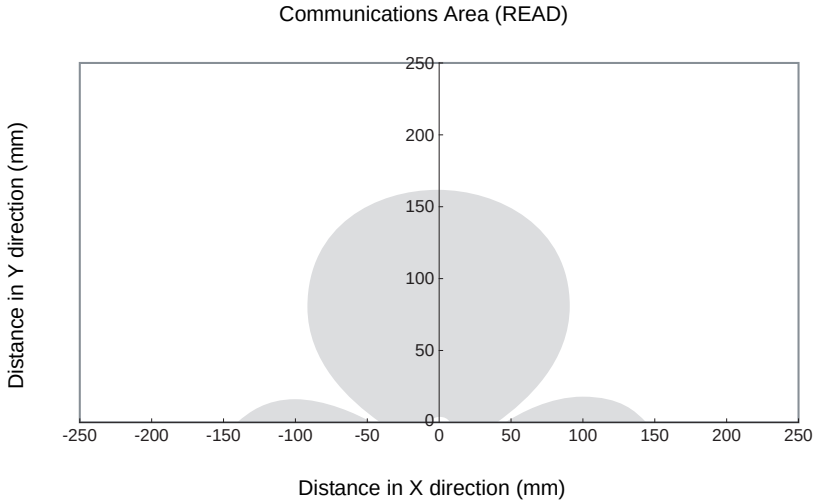


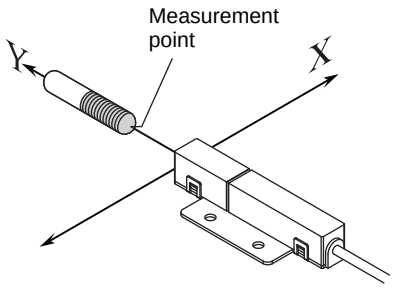
  - WRITE



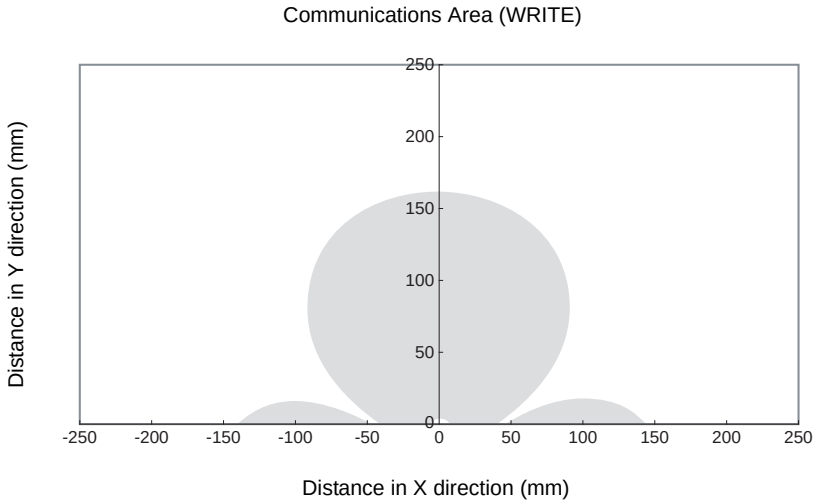


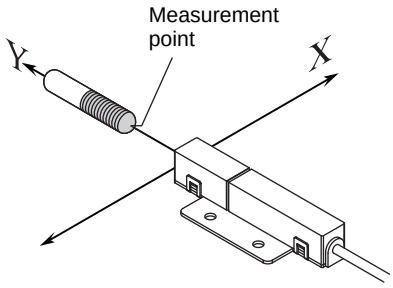
- Coaxial Mounting (RI-TRP-WR2B)
  - READ



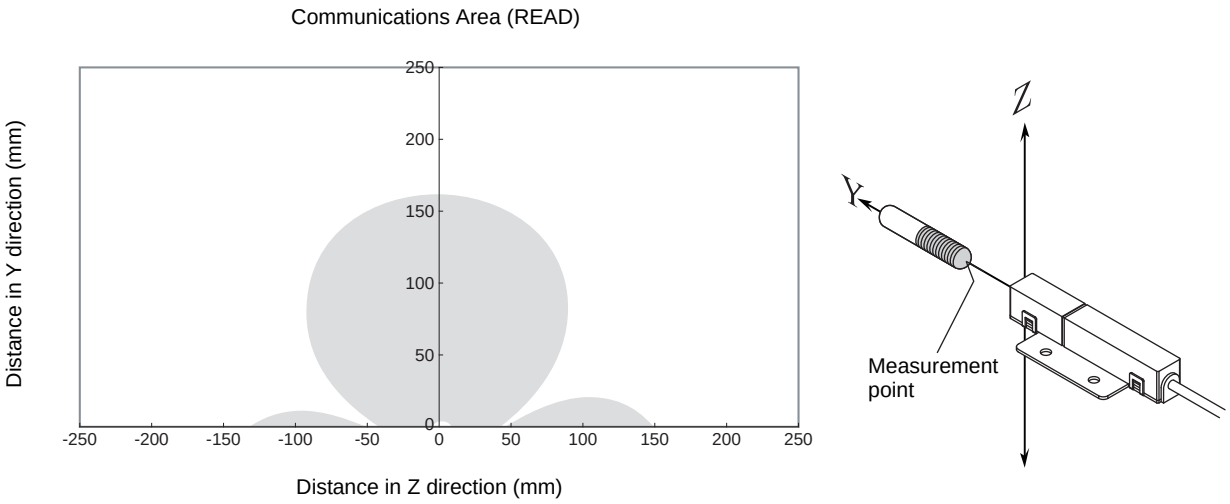


  - WRITE

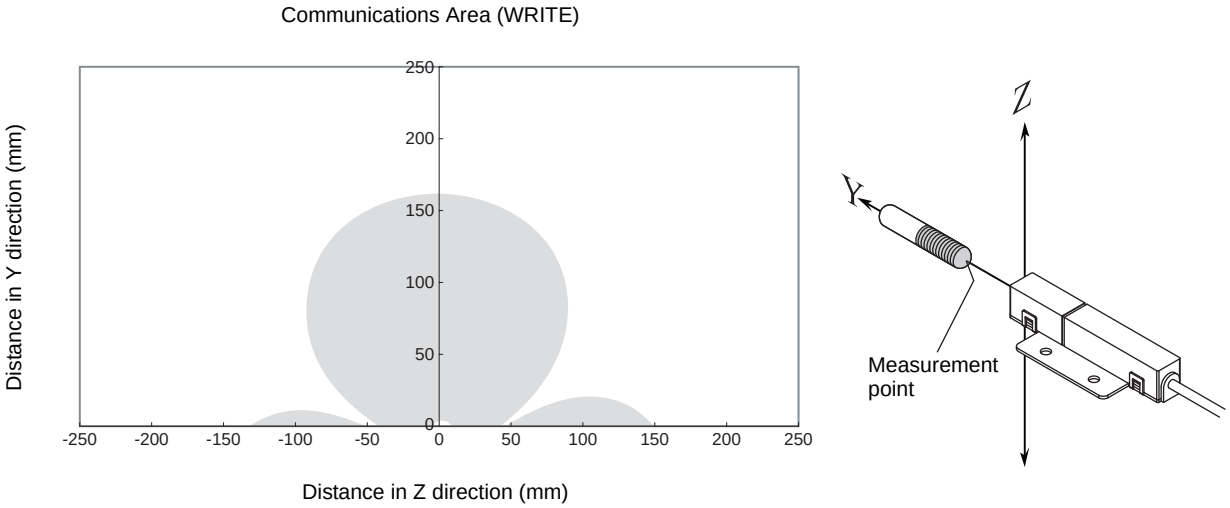




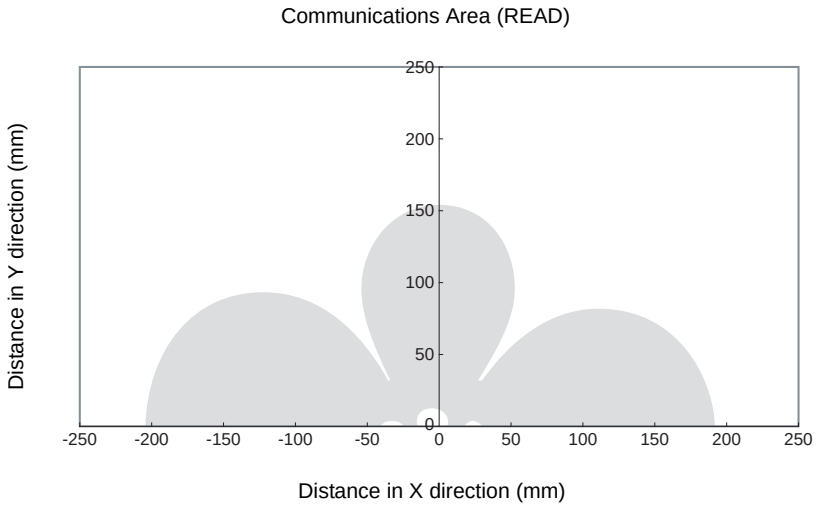
- Coaxial Mounting (RI-TRP-WR2B)
  - READ

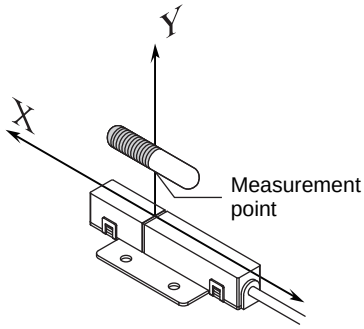


  - WRITE

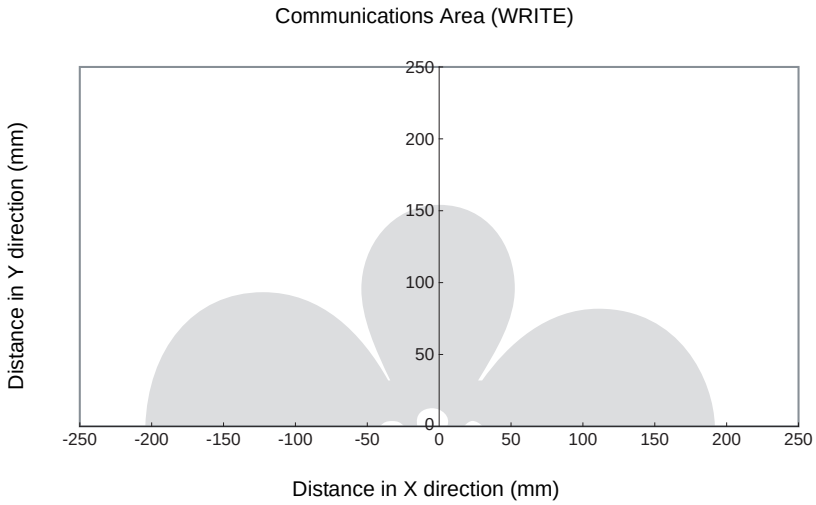


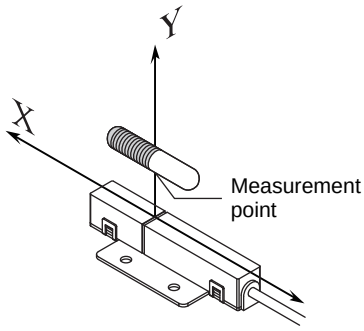
- Parallel Mounting (RI-TRP-WR2B)
  - READ



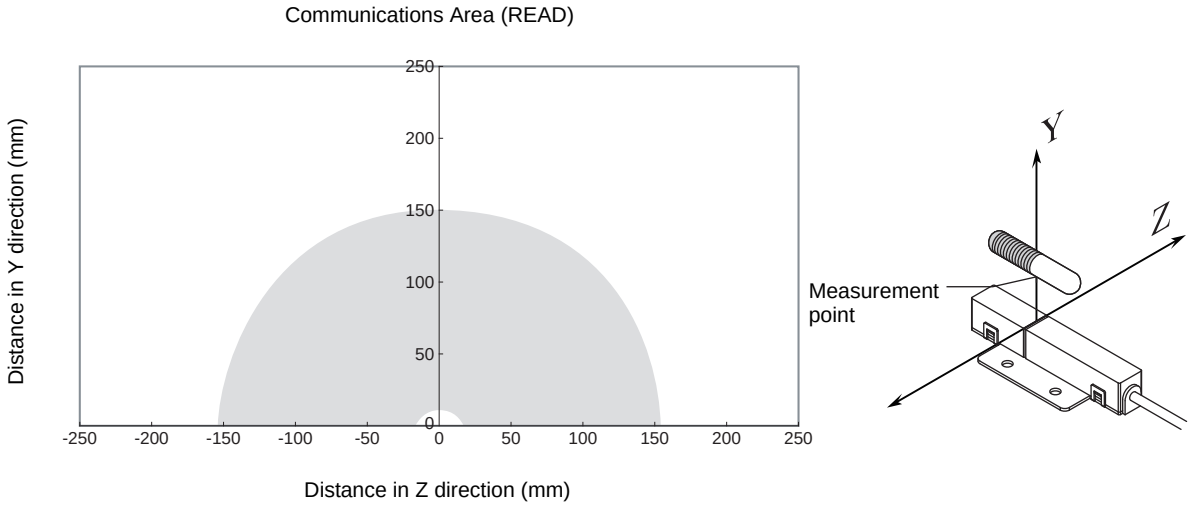


  - WRITE

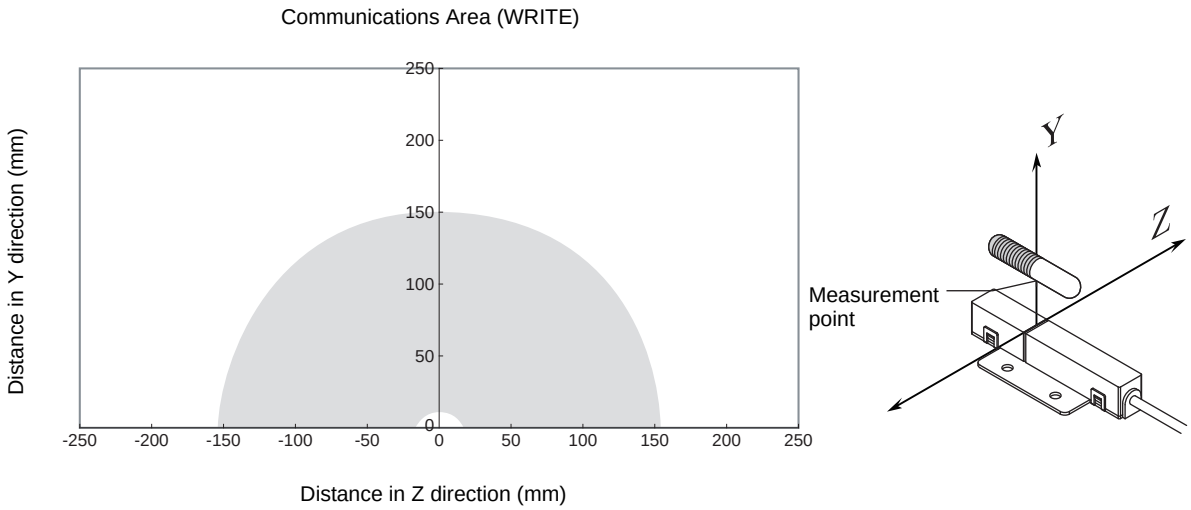




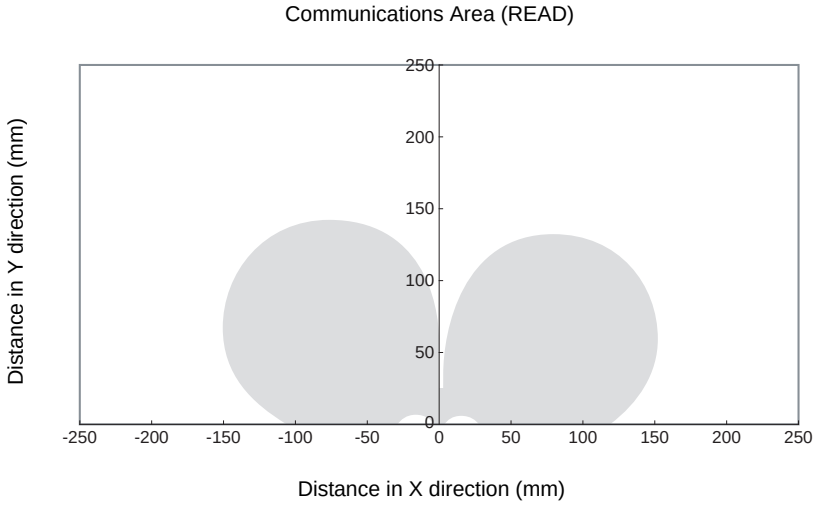
- Parallel Mounting (RI-TRP-WR2B)
  - READ

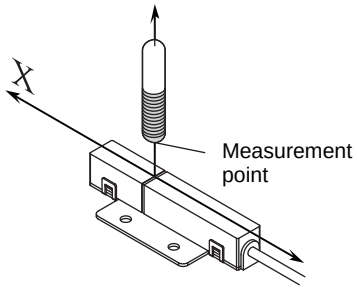


  - WRITE

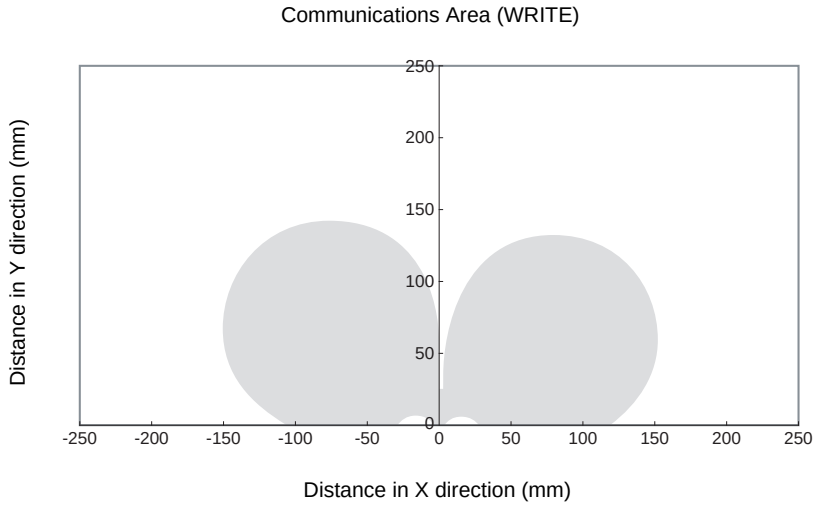


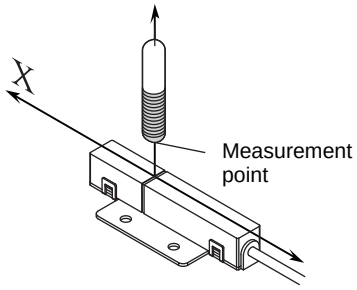
- Vertical Mounting (RI-TRP-WR2B)
  - READ



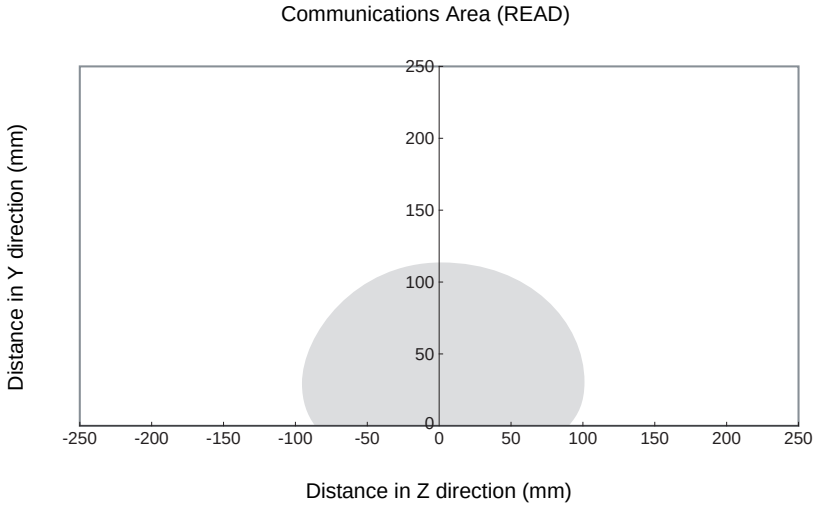


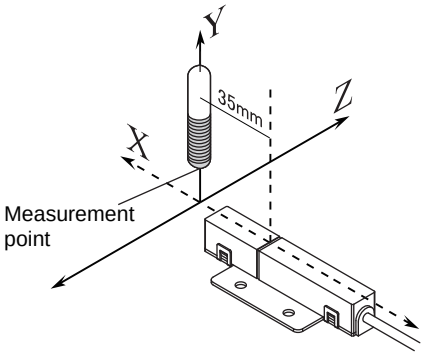
  - WRITE



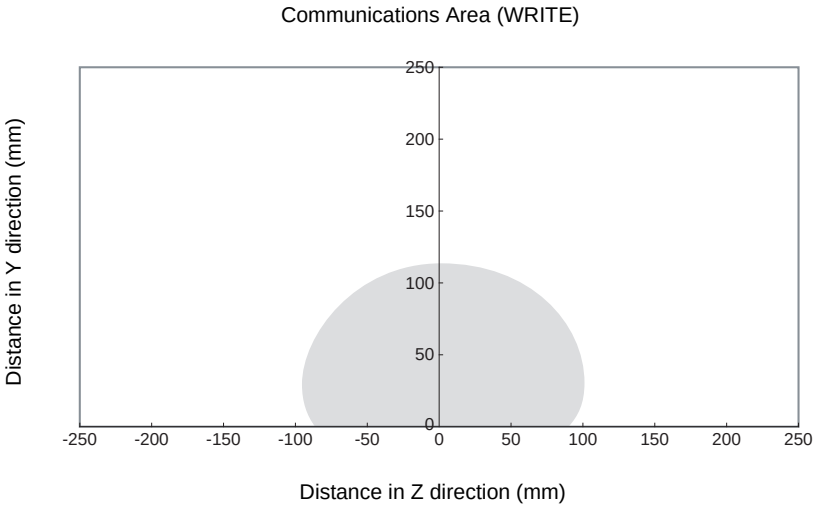


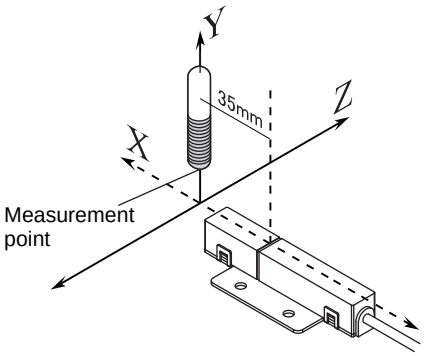
- Vertical Mounting (RI-TRP-WR2B)
  - READ





  - WRITE





Mutual Interference Distances (Reference Only)

If Amplifier Units are connected using multidrop connections and multiple CIDRW Heads are used, the CIDRW Heads will not process commands simultaneously. In this case, install the CIDRW Heads at least 0.1 m apart from each other.

Distance between Antennas and Changes in Communications Distances (Reference Only)

- V640-HS61

Distance between Antennas	Change in communications distance
1,000 mm	100%
900 mm	100%
800 mm	100%
700 mm	99%
600 mm	90%
500 mm	74%
400 mm	55%
300 mm	40%
200 mm	15%

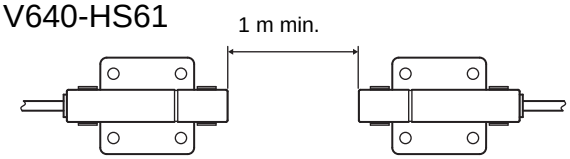
- V640-HS62

Distance between Antennas	Change in communications distance
2,000 mm	99%
1,600 mm	99%
1,400 mm	95%
1,200 mm	84%
1,000 mm	68%
800 mm	53%
600 mm	34%
400 mm	15%
200 mm	0%

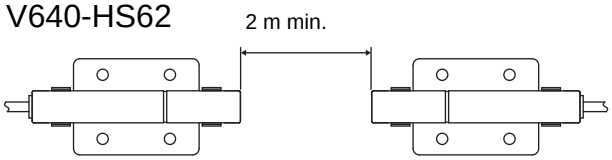
If CIDRW Heads in separate CIDRW systems process commands simultaneously when the CIDRW Systems are installed close to each other, mutual interference between the Heads can result in malfunctions. If this is a problem, install the CIDRW Heads separated at least by the distances shown in the following illustrations.

■ For Coaxial Installation

- V640-HS61

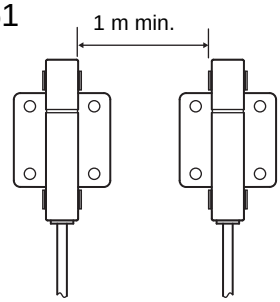


- V640-HS62

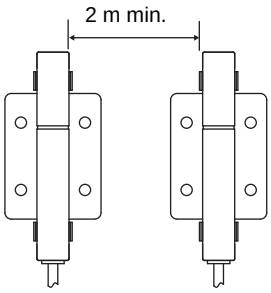


■ For Parallel Installation

- V640-HS61

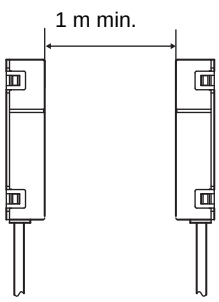


- V640-HS62

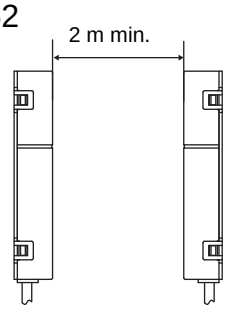


■ For Face-to-Face Installation

- V640-HS61

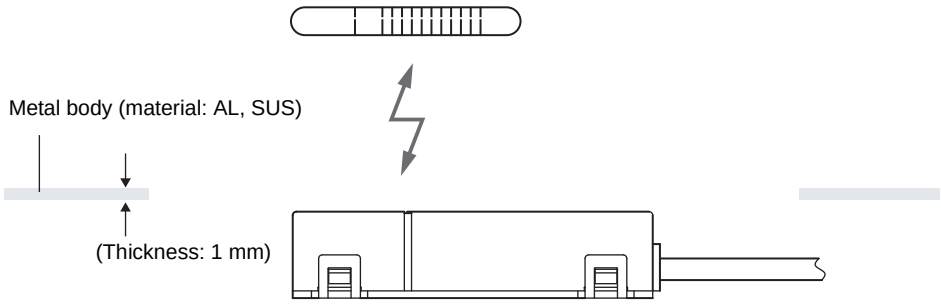


- V640-HS62



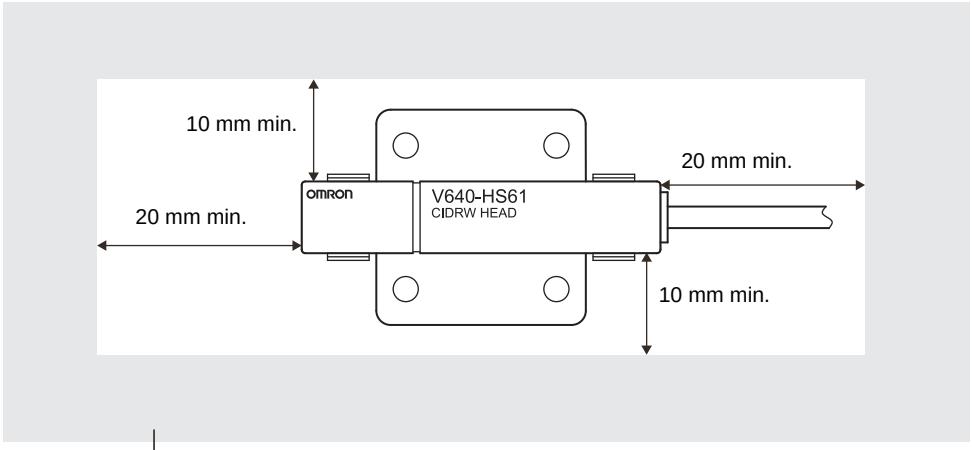
Influence of Background Metals (Reference Only)

The CIDRW Head can also communicate from an opening in a ceiling panel (metal body).

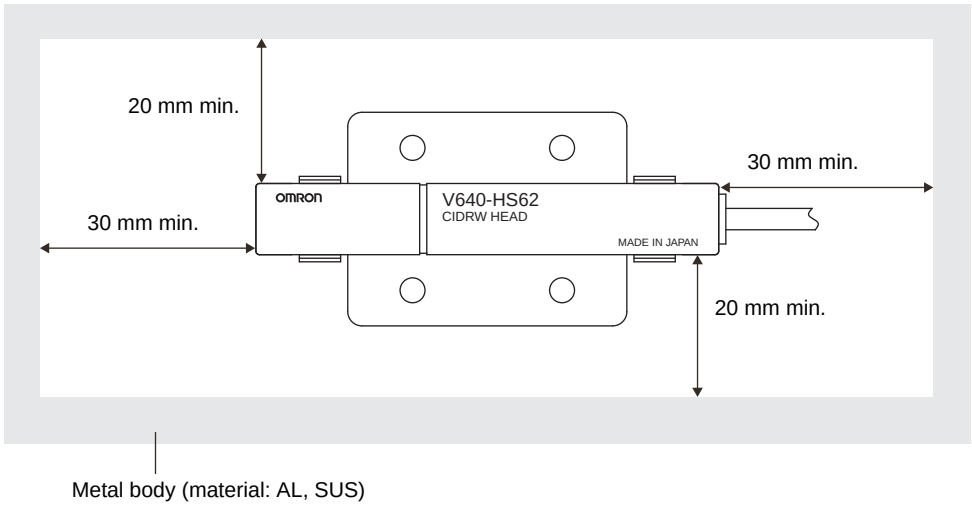


However, ensure the distances indicated below between the CIDRW Head and the metal body. If you do not ensure these distances the communications distance will be substantially shortened.

- V640-HS61

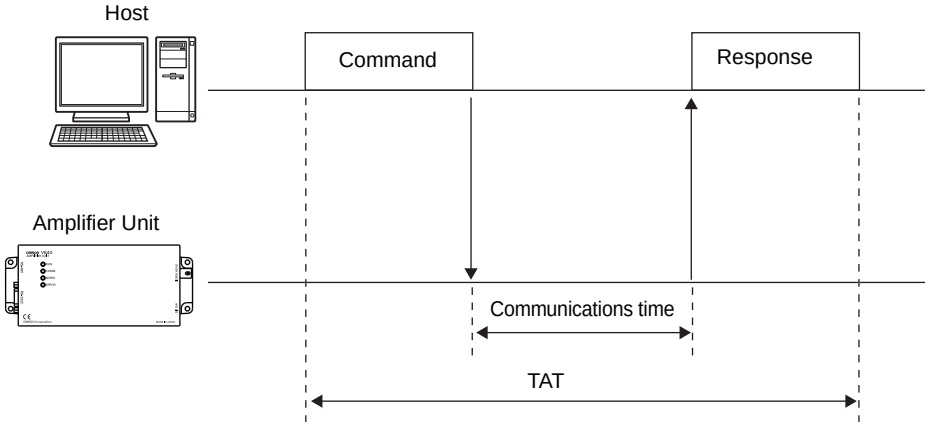


- V640-HS62



Communications Time

Regardless of whether SECS is used or not, take the time required for processing between the host device and Amplifier Units into account when designing the system.



Time	Description
Communications time	This is the time required for communications between an ID Tag and the CIDRW Head.
TAT	This is the time required for processing at the Amplifier Unit, seen from the host device.

Communications time calculation formula (unit: ms)

READ: 138.7 × (number of pages) + 10.0

WRITE, SAME WRITE: 379.8 × (number of pages) + 145.4

BYTE WRITE: 383.0 × (number of pages/8) + 249.0

Rounding up

TAT calculation formula (units: ms)

TAT = command and response transmission time + communications time

The command and response transmission time differs depending on the number of characters sent and the communications conditions.

$$\text{Transmission time (ms)} = \frac{\text{Number of bits per character (bits)} \times 1000}{\text{Baud rate (bps)}} \times \text{total number of characters of command and response}$$

This calculation applies to continuous transmission in which the Controller uses no spaces between command characters.

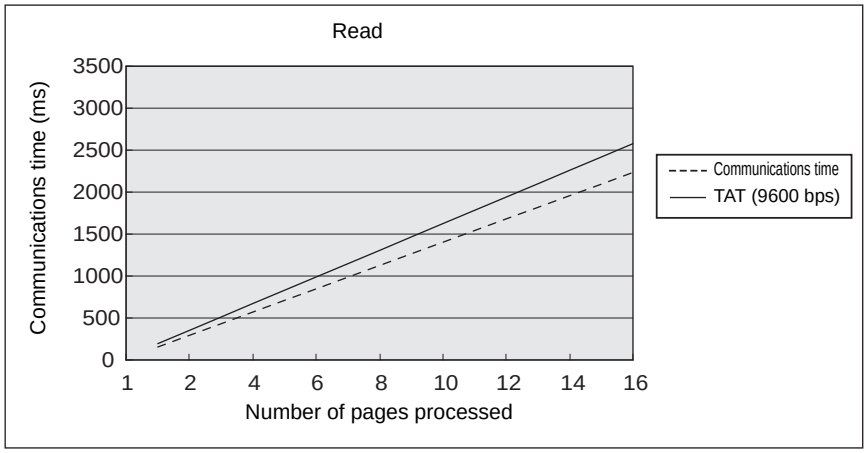
Example of TAT calculation:

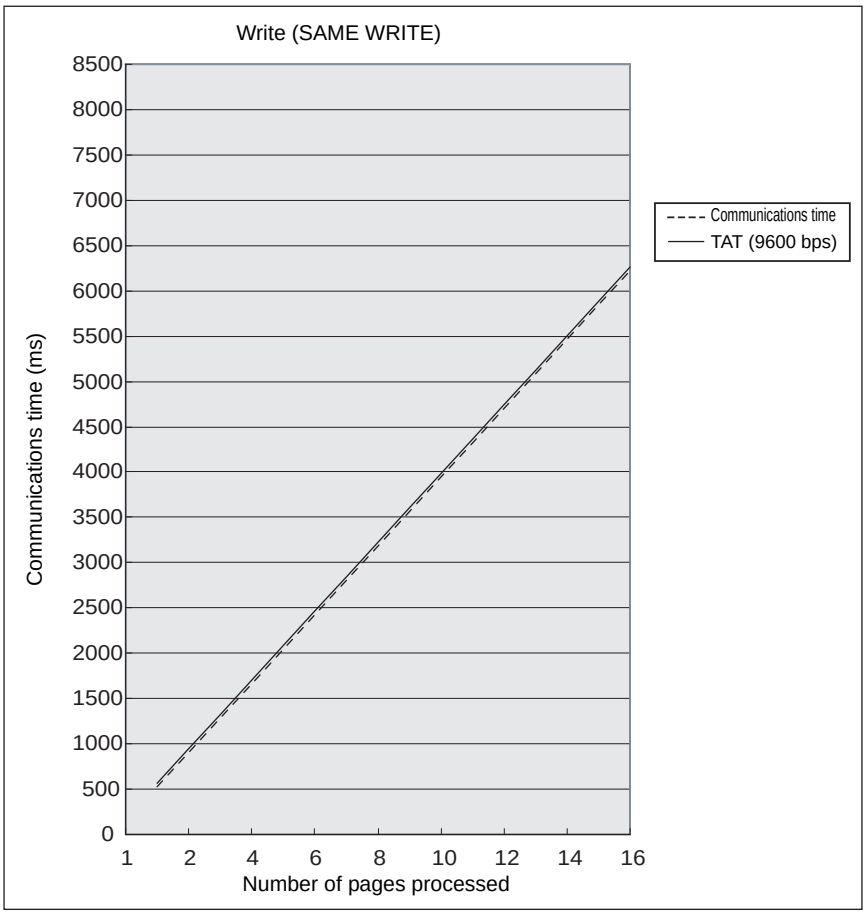
Number of command characters: A; number of response characters: B

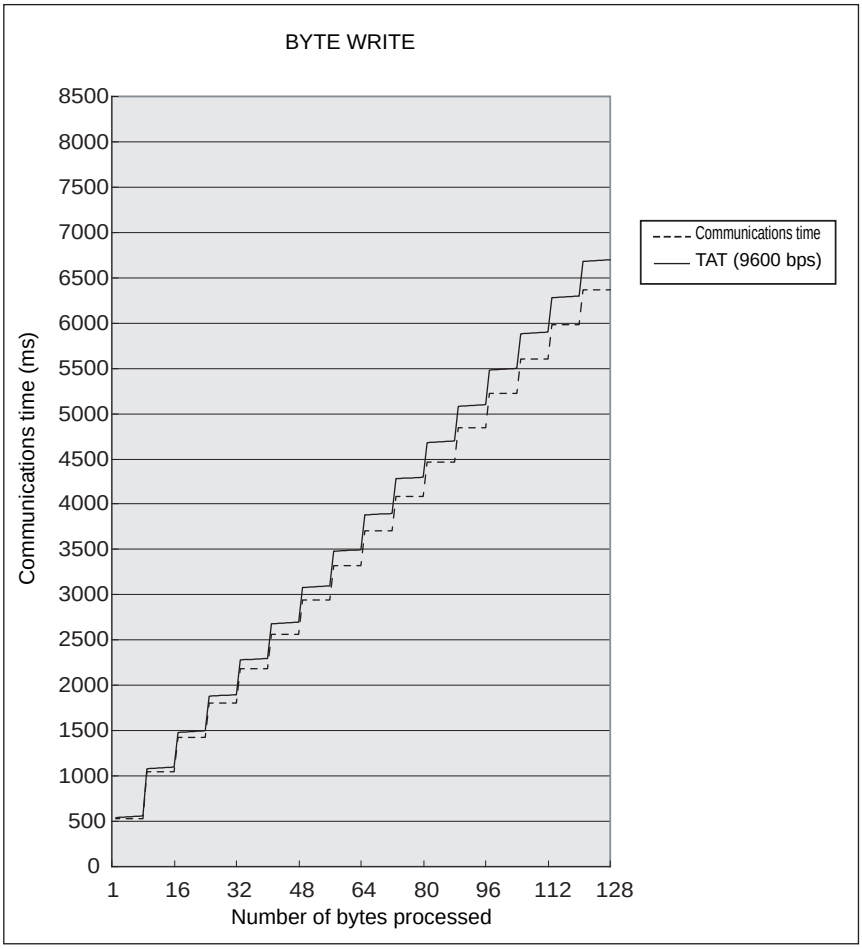
Baud rate: 9600 bps, data length: 8 bits, non parity, 1 stop bit

$$\text{TAT (ms)} = \frac{10 \times 1000}{9600} \times (A + B) + \text{Communications time (ms)}$$

The graph for communications time for communications between the ID Tag and CIDRW Head, and TAT (when the baud rate is 9600 bps), is shown below.
The communications time and TAT, however, may increase substantially according to the conditions of use.







CHECK!

Please confirm beforehand, there is a difference in comparision with V640-HAM11-V3 and V640-HAM11-L in communication time.

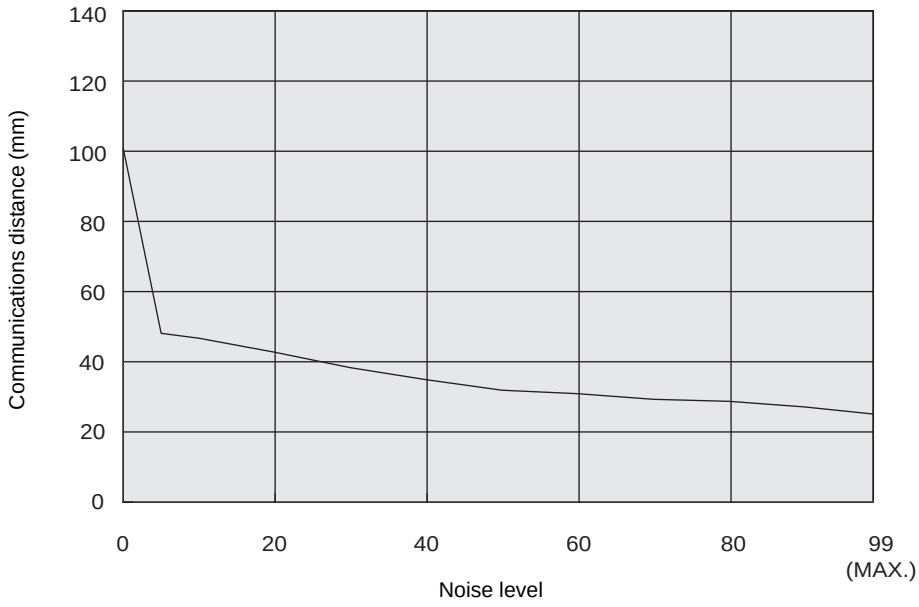
Communications Distance Characteristics vs. Ambient Noise

The graph below compares the results of measurement using the noise measurement function with communications distances.
At installation implement measures in regard to metal in the vicinity of the CIDRW Head, power supply noise, and atmospheric noise, to ensure that the noise level does not exceed 10.

NOISE MEASUREMENT command (applies only when SECS is not used) Refer to page 96.

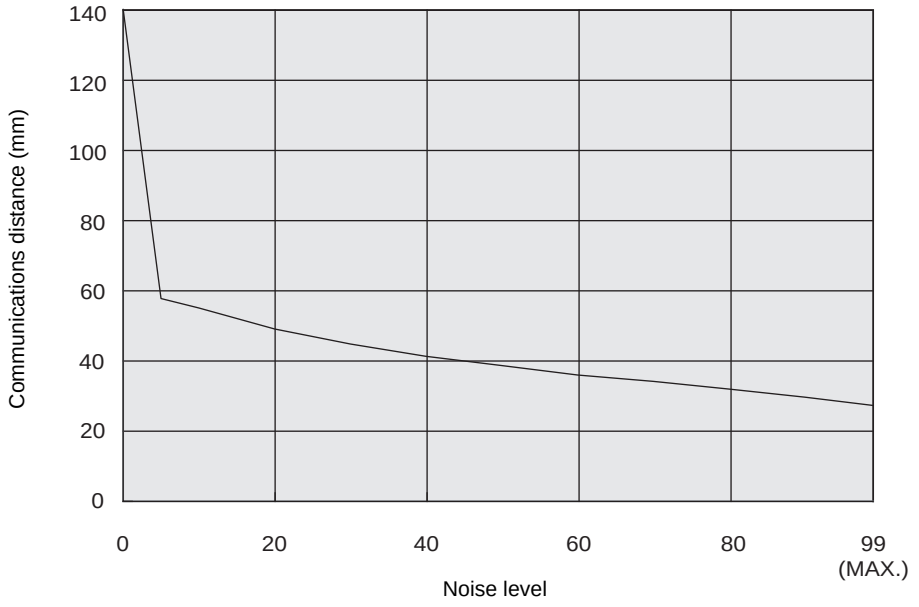
■ V640-HAM11-V4

Relationship between noise level and communications distance (reference values)



■ V640-HAM11-L-V2

Relationship between noise level and communications distance (reference values)



ID Tag Memory Maps

The memory maps of the RI-TRP-DR2B(-30) and RI-TRP-WR2B(-30) ID Tags are given below.
When using a CIDRW Controller, always set the data segment.

Refer to page 55.

■ RI-TRP-DR2B(-30)

ID Tag Memory Map

Page	8 bytes/1 page							
1	00h	01h	02h	03h	04h	05h	06h	07h
2	08h	09h	0Ah	0Bh	0Ch	0Dh	0Eh	0Fh
3	10h	11h	12h	13h	14h	15h	16h	17h
4	18h	19h	1Ah	1Bh	1Ch	1Dh	1Eh	1Fh
5	20h	21h		•••	•••			27h
6	28h	29h		•••	•••			2Fh
7	30h	31h		•••	•••			37h
8								
9								:
10	:							:
11	:							
12								
13								
14	68h	69h		•••	•••			6Fh
15	70h	71h		•••	•••			77h
16	78h	79h		•••	•••			7Fh
17	80h	81h		•••	•••			87h

Carrier ID (16 byte)

Data area (Total of 120 bytes)

Example of data segment settings

DATASEG	LENGTH
Carrier ID	16
"S01"	8
"S02"	8
"S03"	8
"S04"	8
"S05"	8
"S06"	8
"S07"	8
"S08"	8
"S09"	8
"S10"	8
"S11"	8
"S12"	8
"S13"	8
"S14"	8
"S15"	8

CHECK!

- The carrier ID memory area starts from page 1 (fixed).
- 00h to 87h in the table are addresses.
- The RI-TRP-WR2B(-30) has a memory capacity of 136 bytes.

■ RI-TRP-WR2B(-30)

ID Tag Memory Map

Page	8 bytes/1 page							
1	00h	01h	02h	03h	04h	05h	06h	07h

Carrier ID (8 byte)

Example of data segment settings

DATASEG	LENGTH
Carrier ID	8

CHECK!

- The RI-TRP-WR2B(-30) has a memory capacity of 8 bytes.

Regular Inspection

In order to maintain optimum performance of the functions of the CIDRW system, daily and periodic inspections are necessary.

Inspection item		Detail	Criteria	Tools required
Supply voltage fluctuation		Check that the supply voltage fluctuation at the power supply terminal block is within the permissible range.	To be within supply voltage rating.	Multimeter
		Check that there are no frequent instantaneous power failures or radical voltage drops.	To be within permissible voltage fluctuation range.	Power supply analyzer
Environment	Ambient temperature	Check that the ambient temperature and humidity are within specified range.	To be within the specified range.	Maximum and minimum thermometer Hygrometer
	Ambient humidity			
	Vibration and shock	Check that no vibration or shock is transmitted from any machines.		
	Dust	Check that the system is free of dust accumulation.	To be none.	
	Corrosive gas	Check that no metal part of the system is discolored or corroded.		
I/O power supply	Voltage fluctuation	Check on the I/O terminal block that the voltage fluctuation and ripple are within the permissible ranges.	To be within the specified range.	Multimeter Oscilloscope
	Ripple			
Mounting condition		Check that each device is securely mounted.	There must be no loose screws.	—
		Check that each connector is securely connected.	Each connector must be locked or securely tightened with screws.	
		Check that no wire is broken or nearly broken.	There must be no wire that is broken or nearly broken.	
		Check if grounding to 100 Ω or less has been done.	To be grounded to 100 Ω or less.	

SECS Protocol Specifications

A summary of the SEMI standards that relate to CIDRW is provided for reference when using this product. However, since the SEMI standards are subject to revision, you should also refer to the actual standards.

- SEMI E99 THE CARRIER ID READER/WRITER FUNCTIONAL STANDARD
- SEMI E5 EQUIPMENT COMMUNICATION STANDARD 2 MESSAGE CONTENT (SECS II)
- SEMI E4 EQUIPMENT COMMUNICATION STANDARD 1 MESSAGE TRANSFER (SECS I)

Operation Model

Set the CIDRW Controller's mode switch to 0 and start the system. When the system starts, the initial processing is completed first, then the system will operate according to the status defined by E99.

CIDRW Status Model

Operational status	OPERATING	Operation in progress in the operating mode	
		IDLE	Status in which no processing is in progress at any Head
		BUSY	Status when processing is in progress at any of the Heads
	MAINTENANCE	Operation in progress in the maintenance mode # Transitions according to state changes from the host device	
Alarm status	No alarm	Status in which there are no alarms currently in effect at the CIDRW Controller or any of the connected Heads	
	ALARM	Status in which an alarm has occurred • If a Head in an abnormal status is detected during Head detection in initial processing, or no Heads are detected. (The error will not be cleared until the system has been restarted with the Heads connected correctly.) • When a Head error is detected in communications with an ID Tag. (The error will be automatically reset if it is cleared in subsequent processing.) • A CIDRW Controller internal error has occurred.	
Initial status (INITIALIZING)	This is the status during processing such as internal initialization/Head detection after startup, which is maintained until the CIDRW system is capable of its proper functions.		

CIDRW Head Status Model

Operational status	OPERATING	Status in which the Head is operating normally	
		IDLE	Status in which no processing is in progress
		BUSY	Status in which processing is in progress
	NON-OPERATING	Status in which a Head check (IDRW Head, Link Unit) is necessary (The CIDRW alarm status is the ALARM status.)	

Protocol Specifications

- Character Composition

  Start bit (1) + data bits (8) + stop bit (1)

  * Conforms to SEMI E4

- Protocol Parameters

Sign	Name	Default setting	Setting range	Setting unit
BAUD	Baud Rate	9600	1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200	-
DEVID	Device ID	0	0 to 32767	1
T1	Time-out between characters	0.5 s	0.1 to 10 s	0.1 s
T2	Protocol time-out	10 s	0.2 to 25 s	0.2 s
T3	Response time-out	45 s	1 to 120 s	1 s
T4	Time-out between blocks	45 s	1 to 120 s	1 s
RTY	Retry limit	3	0 to 31	1
M/S	Master/slave	M	M: Master S: Slave	-

- Double Block Detection

  The header of the block currently being received is compared with the correct block received immediately before, and double blocks are detected. A setting in the setting mode determines whether this function is used or not.

- Multi-blocks

  Multi-blocks are supported at the receiving side (maximum of 128 blocks).
  Multi-blocks are used at the sending side.

- Message Size

  The maximum receivable message size is 32 kbytes.

- Interleaving

  The receiving side supports interleaving and block interleaving.
  The sending side uses interleaving and block interleaving.
  The maximum number of simultaneously open transactions is 16. If the maximum number is exceeded, SxF0 (abort transmission) is sent.

- Device ID

  The number of device IDs used is 1. Device IDs are specified in the setting mode.

- Block Numbers

  With a single block, the block number is either 1 or 0. For multi-block transmission, the numbers 1 to 128 are used. The block number for a single block is set in the setting mode.

- Treatment of the Systems Bytes

  The system byte comprises the source ID and the transaction ID.
  The source ID is a fixed value and is specified in the setting mode.
  The initial value of the transaction ID is 1 and the maximum value is 0xFFFF. The value is incremented from the first message transmission.

• Storing

The method for storing in the BUSY status, e.g., because the internal buffer is full, is to use NAK transmission.

• Processing for Time-out Detection

At T3 and T4 time-outs, the time-out is notified by the S9F9 message.

• SECS Parameters

Item	Default setting	Range	Setting Unit
Double block detection yes/no	1	1: The header of the block currently being received is compared with the correct block received immediately before, and double blocks are detected. 0: Double block detection is not performed.	-
Source ID	0	0 to 32767	1
Single block No.	1	0, 1	-

Support Attributes

CIDRW Attribute Definitions

	Attribute names	Description	Access	Re-quest	Format and mounting
Basic items	Configuration	Number of CIDRW Heads	RO	Y	20 "00"-"31" The number of Heads connected when the system power is turned ON (automatic recognition)
	AlarmStatus	Substate of current CIDRW alarms	RO	Y	20 "0" = no alarm "1" = alarm has occurred
	OperationalStatus	Substate of current CIDRW operations	RO	Y	20 "IDLE" "BUSY" "MANT"
	SoftwareRevisionLevel	Software revision (version)	RO	Y	20 6byte "VVV.RR" (VVV = version, RR = revision)
	CarrierIDOffset	The position of the offset, referenced to the first byte of the carrier ID in the ID Tag.	RW	N	20 00-15 However, (CarrierIDOffset + CarrierIDLength) ≤ 16.
	CarrierIDlength	The number of bytes in the carrier ID (if there are any non-visible ASCII characters in the carrier ID, the CIDRW returns an error to the host controller.	RW	N	20 01-16 However, (CarrierIDOffset + CarrierIDLength) ≤ 16.
Option	DateInstalled	Date on which the subsystem was installed	RW	N	20 8 bytes All " " (space) on shipping
	DeviceType	CIDR / CIDRW classification	RO	N	20 5 bytes "CIDRW"
	HardwareRevisionLevel	Hardware revision number	RO	N	20 6 bytes "VVV.RR" (VVV = version, RR = revision)
	MaintenanceData	Supplier dependent	RW	N	20 80 bytes 71 bytes " " (space) on shipping
	Manufacturer	Manufacturer's name or ID	RO	N	20 17 bytes "OMRON Corporation"
	ModelNumber	Model name according to the maker	RO	N	20 6 bytes "L22 "
	SerialNumber	System serial number	RO	N	20 max. 20 bytes (Not supported by the CIDRW)

Reader/Writer Head Attribute Definitions

	Attribute names	Description	Access	Re-quest	Format and mounting
Basic items	HeadStatus	Current status	RO	Y	20 "IDLE" "BUSY" "NOOP"
	HeadID	Head number 1 to 31	RO	Y (multi)	20 "01"-"31" ("00" indicates the CIDRW itself, so cannot be used.)
Option	Cycles	Number of read/write operations executed	RO	N	54 (unsigned 4-byte integer) (Not supported by the Reader/Writer Head)
	HeadCondition	Maintenance status	RO	N	20 "NO": No alarm "NM": Status in which normal operation is not possible and maintenance is necessary "RW": Read/write error "RT": Read/write error rate (Not supported by the Reader/Writer Head) "NP": Status of power supply and connection errors
	HeadDateInstalled	Date on which the Head was installed	RO	N	20 "YYYYMMDD" (Not supported by the Reader/Writer Head)
	HeadMaintenanceData	Supplier dependent	N	N	20 (Not supported by the Reader/Writer Head)

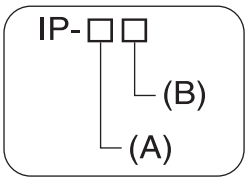
ASCII Code Table

Leftmost bits / Right-most bits	b8 to b5	0000	1001	0010	0011	0100	0101	0110	0111	1000	1101	1010	1011	1100	1101	1110	1111
b4 to b1	Row / Line	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0000	0	NUL	TC7(DLE)	(SP)	0	@	P	`	p	Undefined		Undefined				Undefined	
0001	1	TC1(SOH)	DC_1	!	1	A	Q	a	q								
0010	2	TC2(STX)	DC_2	"	2	B	R	b	r								
0011	3	TC3(ETX)	DC_3	#	3	C	S	c	s								
0100	4	TC4(EOT)	DC_4	$	4	D	T	d	t								
0101	5	TC5(NEQ)	TC_8(NAK)	%	5	E	U	e	u								
0110	6	TC6(ACK)	TC_9(SYN)	&	6	F	V	f	v								
0111	7	BEL	TC_{10}(ETB)	'	7	G	W	g	w								
1000	5	FE0(BS)	CAN	(	8	H	X	h	x								
1001	9	FE1(HT)	EM	)	9	I	Y	i	y								
1010	10	FE2(LF)	SUB	*	:	J	Z	j	z								
1011	11	FE3(VT)	ESC	+	;	K	[	k	{								
1100	12	FE4(FF)	IS_4(FS)	,	<	L	\	l	|								
1101	13	FE5(CR)	IS_3(GS)	-	=	M	]	m	}								
1110	14	S0	IS_2(RS)	.	>	N	^	n	ÅP								
1111	15	S1	IS_1(US)	/	?	O	_	o	DEL								

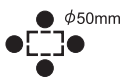
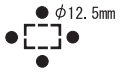
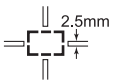
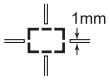
Protective Construction

IP-□□ is governed by the test methods described below. Check in advance the seal characteristics under the actual environment and conditions of use.
IP is the abbreviation of International Protection.

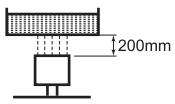
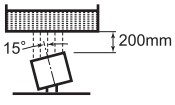
■ IEC (International Electrotechnical Commission) Standard (IEC60529: 2001)

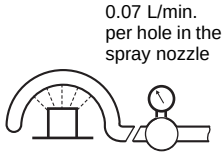
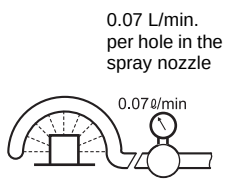
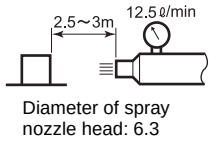
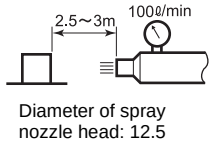
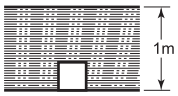


(A) First numeral in code: Class of protection against entry of solid foreign material

Class	Degree of protection	
0		No protection
1		Protected against access by solid objects with a diameter of 50 mm or greater (e.g., human hands).
2		Protected against access by solid objects with a diameter of 12.5 mm or greater (e.g., fingers).
3		Protected against access by wires and solid bodies with a diameter of 2.5 mm or greater.
4		Protected against access by wires and solid bodies with a diameter of 1 mm or greater.
5		Entry of volumes of dust that would cause difficulties in normal operation of devices or compromise safety is prevented.
6		Entry of dust is prevented.

(B) Second numeral of code: Class of protection against the entry of water

Class	**Degree of protection**		**Outline of test methods (tests using water)**
0	No special protection	No protection against the entry of water.	No test
1	Protection against droplets of water	The product suffers no ill effects from droplets of water falling vertically onto it.	Water droplets are sprayed onto the product from directly above for 10 minutes by water droplet exposure test apparatus. 
2	Protection against droplets of water	The product suffers no ill effects from droplets of water directed at it at an angle of up to 15° to vertical.	The water droplet exposure test apparatus is set to 15° from vertical and water droplets sprayed onto the product for 10 minutes (total of 25 minutes in each direction). 

Class	Degree of protection		Outline of test methods (tests using water)
3	Protection against spraying water	The product suffers no ill effects from a water spray directed at it at up to 60° from vertical.	Using the test apparatus shown in the figure to the right, water is sprayed from both directions, onto both sides of the product, at angles up to 60° from vertical for 10 minutes. 
4	Protection against splashing water	The product suffers no ill effects from water splashed on it from all directions.	Using the test apparatus shown in the figure to the right, water is splashed onto the product from all directions for 10 minutes. 
5	Protection against water jets	The product suffers no ill effects from a water jet aimed directly at it from all directions.	Using the test apparatus shown in the figure to the right, a water jet is directed at the product from all directions for 1 minute per square meter of outer casing, with a minimum total exposure of 3 minutes. 
6	Protection against powerful jets of water	Water does not enter the product when a powerful jet of water is directed at it from all directions.	Using the test apparatus shown in the figure to the right, a water jet is directed at the product from all directions for 1 minute per square meter of outer casing, with a minimum total exposure of 3 minutes. 
7	Protection against immersion in water	No entry of water on immersion in water at the stipulated pressure for the stipulated time.	Immerse in water for 30 minutes at a depth of 1 meter (when the height of the apparatus is less than 850 mm). 
8 (See note.)	Protection against immersion in water	The product can be used while continually immersed in water.	Depends on arrangements made between the manufacturer and the user of the product.

Note: OMRON Test Method

Usage condition: 10 m or less under water in natural conditions

1. No water ingress after 1 hour under water at 2 atmospheres of pressure.
2. Sensing distance and insulation resistance specifications must be met after 100 repetitions of half hour in 5°C water and half hour in 85°C water.

About IPX9K

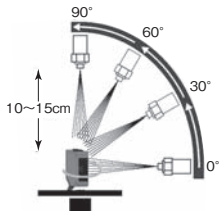
IPX9K is a protection standard regarding high temperature and high-pressure water which is defined by the German standard (DIN 40050 PART9).

Water is sprayed on 80 °C hot water with the water pressure of 80 to 100BAR from a nozzle to the test piece.

Amount of water is 14 to 16 liters/minute.

The distance between the test piece and a nozzle is 10 to 15 cm, and the directions of water-drainage are 0 degrees, 30 degrees, 60 degrees, and 90 degrees horizontally.

They are evaluated with the test piece is rotating on a horizontal plane by 30 seconds in each direction.



■ Oil Resistance (OMRON in-house standard)

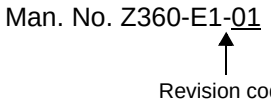
Protection	
Oil-resistant	No adverse affect from oil drops or oil spray approaching from any direction.
Oil-proof	Protects against penetration of oil drops or oil spray approaching from any direction.

Note. Oil resistance has been tested using a specific oil as defined in the OMRON test method. (JIS C 0920:2003, Appendix 1)

MEMO

Revision History

A manual revision code appears as a suffix to the catalog number on the front cover of the manual.



The following table outlines the changes made to the manual during each revision. Page numbers refer to the previous version.

Revision code	Date	Revised content
01	June 2015	Original production

Terms and Conditions of Sale

1. Offer; Acceptance. These terms and conditions (these "Terms") are deemed part of all quotes, agreements, purchase orders, acknowledgments, price lists, catalogs, manuals, brochures and other documents, whether electronic or in writing, relating to the sale of products or services (collectively, the "Products") by Omron Electronics LLC and its subsidiary companies ("Omron"). Omron objects to any terms or conditions proposed in Buyer's purchase order or other documents which are inconsistent with, or in addition to, these Terms.
2. Prices; Payment Terms. All prices stated are current, subject to change without notice by Omron. Omron reserves the right to increase or decrease prices on any unshipped portions of outstanding orders. Payments for Products are due net 30 days unless otherwise stated in the invoice.
3. Discounts. Cash discounts, if any, will apply only on the net amount of invoices sent to Buyer after deducting transportation charges, taxes and duties, and will be allowed only if (i) the invoice is paid according to Omron's payment terms and (ii) Buyer has no past due amounts.
4. Interest. Omron, at its option, may charge Buyer 1-1/2% interest per month or the maximum legal rate, whichever is less, on any balance not paid within the stated terms.
5. Orders. Omron will accept no order less than $200 net billing.
6. Governmental Approvals. Buyer shall be responsible for, and shall bear all costs involved in, obtaining any government approvals required for the importation or sale of the Products.
7. Taxes. All taxes, duties and other governmental charges (other than general real property and income taxes), including any interest or penalties thereon, imposed directly or indirectly on Omron or required to be collected directly or indirectly by Omron for the manufacture, production, sale, delivery, importation, consumption or use of the Products sold hereunder (including customs duties and sales, excise, use, turnover and license taxes) shall be charged to and remitted by Buyer to Omron.
8. Financial. If the financial position of Buyer at any time becomes unsatisfactory to Omron, Omron reserves the right to stop shipments or require satisfactory security or payment in advance. If Buyer fails to make payment or otherwise comply with these Terms or any related agreement, Omron may (without liability and in addition to other remedies) cancel any unshipped portion of Products sold hereunder and stop any Products in transit until Buyer pays all amounts, including amounts payable hereunder, whether or not then due, which are owing to it by Buyer. Buyer shall in any event remain liable for all unpaid accounts.
9. Cancellation; Etc. Orders are not subject to rescheduling or cancellation unless Buyer indemnifies Omron against all related costs or expenses.
10. Force Majeure. Omron shall not be liable for any delay or failure in delivery resulting from causes beyond its control, including earthquakes, fires, floods, strikes or other labor disputes, shortage of labor or materials, accidents to machinery, acts of sabotage, riots, delay in or lack of transportation or the requirements of any government authority.
11. Shipping; Delivery. Unless otherwise expressly agreed in writing by Omron:
    a. Shipments shall be by a carrier selected by Omron; Omron will not drop ship except in "break down" situations.
    b. Such carrier shall act as the agent of Buyer and delivery to such carrier shall constitute delivery to Buyer;
    c. All sales and shipments of Products shall be FOB shipping point (unless otherwise stated in writing by Omron), at which point title and risk of loss shall pass from Omron to Buyer; provided that Omron shall retain a security interest in the Products until the full purchase price is paid;
    d. Delivery and shipping dates are estimates only; and
    e. Omron will package Products as it deems proper for protection against normal handling and extra charges apply to special conditions.
12. Claims. Any claim by Buyer against Omron for shortage or damage to the Products occurring before delivery to the carrier must be presented in writing to Omron within 30 days of receipt of shipment and include the original transportation bill signed by the carrier noting that the carrier received the Products from Omron in the condition claimed.
13. Warranties. (a) Exclusive Warranty. Omron's exclusive warranty is that the Products will be free from defects in materials and workmanship for a period of twelve months from the date of sale by Omron (or such other period expressed in writing by Omron). Omron disclaims all other warranties, express or implied. (b) Limitations. OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, ABOUT NON-INFRINGEMENT, MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF THE PRODUCTS. BUYER ACKNOWLEDGES THAT IT ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. Omron further disclaims all warranties and responsibility of any type for claims or expenses based on infringement by the Products or otherwise of any intellectual property right. (c) Buyer Remedy. Omron's sole obligation hereunder shall be, at Omron's election, to (i) replace (in the form originally shipped with Buyer responsible for labor charges for removal or replacement thereof) the non-complying Product, (ii) repair the non-complying Product, or (iii) repay or credit Buyer an amount equal to the purchase price of the non-complying Product; provided that in no event shall Omron be responsible for warranty, repair, indemnity or any other claims or expenses regarding the Products unless Omron's analysis confirms that the Products were properly handled, stored, installed and maintained and not subject to contamination, abuse, misuse or inappropriate modification. Return of any Products by Buyer must be approved in writing by Omron before shipment. Omron Companies shall not be liable for the suitability or unsuitability or the results from the use of Products in combination with any electrical or electronic components, circuits, system assemblies or any other materials or substances or environments. Any advice, recommendations or information given orally or in writing, are not to be construed as an amendment or addition to the above warranty. See http://www.omron247.com or contact your Omron representative for published information.
14. Limitation on Liability; Etc. OMRON COMPANIES SHALL NOT BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR PRODUCTION OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED IN CONTRACT, WARRANTY, NEGLIGENCE OR STRICT LIABILITY. Further, in no event shall liability of Omron Companies exceed the individual price of the Product on which liability is asserted.
15. Indemnities. Buyer shall indemnify and hold harmless Omron Companies and their employees from and against all liabilities, losses, claims, costs and expenses (including attorney's fees and expenses) related to any claim, investigation, litigation or proceeding (whether or not Omron is a party) which arises or is alleged to arise from Buyer's acts or omissions under these Terms or in any way with respect to the Products. Without limiting the foregoing, Buyer (at its own expense) shall indemnify and hold harmless Omron and defend or settle any action brought against such Companies to the extent based on a claim that any Product made to Buyer specifications infringed intellectual property rights of another party.
16. Property; Confidentiality. Any intellectual property in the Products is the exclusive property of Omron Companies and Buyer shall not attempt to duplicate it in any way without the written permission of Omron. Notwithstanding any charges to Buyer for engineering or tooling, all engineering and tooling shall remain the exclusive property of Omron. All information and materials supplied by Omron to Buyer relating to the Products are confidential and proprietary, and Buyer shall limit distribution thereof to its trusted employees and strictly prevent disclosure to any third party.
17. Export Controls. Buyer shall comply with all applicable laws, regulations and licenses regarding (i) export of products or information; (iii) sale of products to "forbidden" or other proscribed persons; and (ii) disclosure to non-citizens of regulated technology or information.
18. Miscellaneous. (a) Waiver. No failure or delay by Omron in exercising any right and no course of dealing between Buyer and Omron shall operate as a waiver of rights by Omron. (b) Assignment. Buyer may not assign its rights hereunder without Omron's written consent. (c) Law. These Terms are governed by the law of the jurisdiction of the home office of the Omron company from which Buyer is purchasing the Products (without regard to conflict of law principles). (d) Amendment. These Terms constitute the entire agreement between Buyer and Omron relating to the Products, and no provision may be changed or waived unless in writing signed by the parties. (e) Severability. If any provision hereof is rendered ineffective or invalid, such provision shall not invalidate any other provision. (f) Setoff. Buyer shall have no right to set off any amounts against the amount owing in respect of this invoice. (g) Definitions. As used herein, "including" means "including without limitation"; and "Omron Companies" (or similar words) mean Omron Corporation and any direct or indirect subsidiary or affiliate thereof.

Certain Precautions on Specifications and Use

1. Suitability of Use. Omron Companies shall not be responsible for conformity with any standards, codes or regulations which apply to the combination of the Product in the Buyer's application or use of the Product. At Buyer's request, Omron will provide applicable third party certification documents identifying ratings and limitations of use which apply to the Product. This information by itself is not sufficient for a complete determination of the suitability of the Product in combination with the end product, machine, system, or other application or use. Buyer shall be solely responsible for determining appropriateness of the particular Product with respect to Buyer's application, product or system. Buyer shall take application responsibility in all cases but the following is a non-exhaustive list of applications for which particular attention must be given:
   (i) Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this document.
   (ii) Use in consumer products or any use in significant quantities.
   (iii) Energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
   (iv) Systems, machines and equipment that could present a risk to life or property. Please know and observe all prohibitions of use applicable to this Product.
   NEVER USE THE PRODUCT FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY OR IN LARGE QUANTITIES WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON'S PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.
2. Programmable Products. Omron Companies shall not be responsible for the user's programming of a programmable Product, or any consequence thereof.
3. Performance Data. Data presented in Omron Company websites, catalogs and other materials is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of Omron's test conditions, and the user must correlate it to actual application requirements. Actual performance is subject to the Omron's Warranty and Limitations of Liability.
4. Change in Specifications. Product specifications and accessories may be changed at any time based on improvements and other reasons. It is our practice to change part numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the Product may be changed without any notice. When in doubt, special part numbers may be assigned to fix or establish key specifications for your application. Please consult with your Omron's representative at any time to confirm actual specifications of purchased Product.
5. Errors and Omissions. Information presented by Omron Companies has been checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical or proofreading errors or omissions.

OMRON
AUTOMATION & SAFETY

OMRON AUTOMATION AND SAFETY • THE AMERICAS HEADQUARTERS • Chicago, IL USA • 847.843.7900 • 800.556.6766 • www.omron247.com

OMRON CANADA, INC. • HEAD OFFICE
Toronto, ON, Canada • 416.286.6465 • 866.986.6766 • www.omron247.com

OMRON ELECTRONICS DE MEXICO • HEAD OFFICE
México DF • 52.55.59.01.43.00 • 01-800-226-6766 • mela@omron.com

OMRON ELECTRONICS DE MEXICO • SALES OFFICE
Apodaca, N.L. • 52.81.11.56.99.20 • 01-800-226-6766 • mela@omron.com

OMRON ELETRÔNICA DO BRASIL LTDA • HEAD OFFICE
São Paulo, SP, Brasil • 55.11.2101.6300 • www.omron.com.br

OMRON ARGENTINA • SALES OFFICE
Cono Sur • 54.11.4783.5300

OMRON CHILE • SALES OFFICE
Santiago • 56.9.9917.3920

OTHER OMRON LATIN AMERICA SALES
54.11.4783.5300

OMRON EUROPE B.V. • Wegalaan 67-69, NL-2132 JD, Hoofddorp, The Netherlands. • +31 (0) 23 568 13 00 • www.industrial.omron.eu

Authorized Distributor:

Automation Control Systems
• Machine Automation Controllers (MAC) • Programmable Controllers (PLC)
• Operator interfaces (HMI) • Distributed I/O • Software

Drives & Motion Controls
• Servo & AC Drives • Motion Controllers & Encoders

Temperature & Process Controllers
• Single and Multi-loop Controllers

Sensors & Vision
• Proximity Sensors • Photoelectric Sensors • Fiber-Optic Sensors
• Amplified Photomicrosensors • Measurement Sensors
• Ultrasonic Sensors • Vision Sensors

Industrial Components
• RFID/Code Readers • Relays • Pushbuttons & Indicators
• Limit and Basic Switches • Timers • Counters • Metering Devices
• Power Supplies

Safety
• Laser Scanners • Safety Mats • Edges and Bumpers • Programmable Safety Controllers • Light Curtains • Safety Relays • Safety Interlock Switches

Z360_E1-01 06/15 Note: Specifications are subject to change. © 2015 Omron Electronics LLC Printed in U.S.A.

Printed on recycled paper.